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May 8, 2014

Ms. Debbie Davis, Community & Rural Affairs Advisor
Governor's Office of Planning and Research
1400 Tenth Street, Sacramento CA 95814

Sent via Email

Subject: Water Action Plan: Improving Groundwater Management -
GRA Recommendations for Sustainable Groundwater Management

Dear Debbie Davis:

The Groundwater Resources Association of California is please to submit "GRA's Recommendations for Sustainable Groundwater Management in California" to the Governor's Office of Planning and Research. This document was prepared by GRA's Board of Directors and Legislative Committee members based on our personal knowledge and experience on working on California groundwater issues for decades. Also enclosed is a brief summary of GRA's comments on the key components of the recent submittals by the California Water Foundation (CWF) and the Association of California Water Agencies (ACWA) on their recommendations for sustainable groundwater management. GRA largely supports those efforts and recommendations with some exceptions and suggestions as noted.

GRA's recommendations are structured similarly to CWF and ACWA in the following general areas:

- Defining Sustainable Groundwater Management
- Statewide Priorities for Sustaining Groundwater Resources
- Local Groundwater Management Entities
- Groundwater Management Plans
- State's Role in Groundwater
- Funding for Groundwater Management
- Need to Increase Groundwater Recharge and Storage

The focus of GRA's recommendations are concentrated more on the details of the basic science and technical information needed to manage groundwater resources sustainably, and suggestions for the state framework required for this initiative on

1215 K Street, Suite 940
Sacramento, CA 95814
(916) 446-3626 / (916) 231-2141 (fax)
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sustainable groundwater to be successful. This includes identification of a list of tasks and elements needed specifically to address many of the groundwater data gaps and transparency challenges as well as identification of the need to implement economy-of-scale, multi-state-federal-agency cooperative efforts to further the understanding of California's groundwater resources.

One unique suggestion as a first step in the process is the concept of developing brief, concise Corrective Action Work Plans (CAWP). This would apply to all groundwater management areas not in compliance with existing water code requirements for groundwater management, and/or where the groundwater management program is ineffective. The CAWP would entail the following steps:

1) DWR would be required to identify all those basins, subbasins, fractured rock aquifers, and other groundwater areas facing unsustainable management practices and risking adverse affects, such as chronic depletion, subsidence, environmental impacts, and water quality degradation. Those areas would be reported to the SWRCB.

2) The SWRCB would require the local agencies responsible for managing groundwater in those areas (if any) to submit a CAWP to the SWRCB and DWR to identify the deficiencies and the next steps and timeline for developing a sustainable groundwater management plan.

3) If a management agency in those deficient areas cannot or will not comply, or a management agency does not exist, then the SWRCB will direct the DWR to intervene and prepare a CAWP for adoption and implementation by the state.

Thank you for the opportunity to submit our recommendations on this very important issue. Please do not hesitate to contact either of the undersigned if you have questions.

Sincerely,

Theodore A. Johnson
President, Board of Directors
(562) 275-4240 tjohnson@wrd.ord

Timothy K. Parker
Director, Legislative Chairman
(916) 596-9163 tim@pg-tim.com

Attachments
cc: Sarah Kline, GRA Administrative Executive
GRA Directors

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Recommendations for Sustainable Groundwater Management in California

INTRODUCTION

The Groundwater Resources Association of California (GRA) has prepared these recommendations in response to the Administration's solicitation for input and information to develop proposed solutions to accomplish Sustainable Groundwater Management. The California Water Action Plan highlights the challenges for managing the State's water resources and outlines a series of strategic goals and actions, including the following specific groundwater actions:

- Provide essential data to enable sustainable groundwater management
- Support funding partnerships for storage projects
- Update DWR Bulletin 118, California's Groundwater Plan
- Improve sustainable groundwater management
- Support distributed groundwater storage
- Increase statewide groundwater recharge
- Accelerate clean-up of contaminated groundwater and prevent future contamination

The plan specifically identifies a number of actions to implement sustainable groundwater management practices. One action calls for legislation to provide local agencies with the tools and comprehensive authority to address their groundwater challenges, and to allow the State to temporarily assume groundwater management responsibilities when local agencies cannot achieve sustainable management.

For over 20 years, one of the primary objectives of GRA has been to help formulate statewide policy on the development, management and protection of the state's groundwater resources (as well as soil and groundwater remediation and environmental assessments). In taking a pro-active role with the Legislature and Administration, and as an authority on technical groundwater issues, our recommendations and analyses are based on the association's collective technical and scientific experience. GRA is dedicated to resource management that protects and improves groundwater supply and quality through education and technical leadership. Understanding of technical issues and education are generally the best means to promote the implementation of sound groundwater assessment,

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groundwater resources protection, and sustainable groundwater management in California.

California is a leading global economy (8th in the world), which relies to a significant degree on groundwater. Water is vital to the California economy, but not always in the ways one might think. It is a scarce resource, subject to numerous and competing demands—including increasing demands for environmental uses.[1] And the state essentially stopped expanding its vast surface storage network several decades ago. Yet the economy has weathered periodic droughts, and enough water has been available to support a growing population and economy, thanks to management innovations including water use efficiency, water markets, groundwater storage (or "banking"), reuse of highly treated wastewater, and unfortunately, groundwater overdraft. Where surface water availability has declined, groundwater is used instead, and in drought years statewide as much as 60 % or more of the water supply comes from groundwater.

California's share is nearly one-fifth of the groundwater used in the United States. Yet California lacks in fully understanding the extent and condition of groundwater resources statewide. California also lacks in technologies and programs to integrate and optimize data collection, data integration and evaluation, and making information available to local agencies and the public. California has thus far not made the commitment and 'sustained' investments to thoroughly, consistently, and regularly inventory, monitor and report on groundwater conditions statewide. This is a long-term failure of state government leadership and needs to be addressed within this groundwater action plan initiative. Not all local groundwater management programs are created equal, and although many groundwater basins are being locally managed appropriately, many are not and there is much improvement needed. Besides judicial resolution, it has generally been local groundwater management that has protected and saved groundwater resources. GRA supports and encourages the Administration and Legislature to make the difficult and correct decisions now, not only to accomplish sustainable groundwater management, but to mandate state agencies' roles and provide the continuously funded technical support and technology infrastructure that are needed to assist local agencies' groundwater protection and management programs in the future.

GRA has reviewed and supports the comprehensive findings and recommendations of the California Water Foundation (CWF, May 2014) and Association of California Water Agencies (ACWA, April 2014) in their documents on sustainable groundwater management. We offer our comments and recommendations in addition to those prepared by CWF and ACWA in this document and an attached summary table. For ease of reference, the remainder of this document follows the numbered topical sections of the CWF recommendations.

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[1] Public Policy Institute. 2012. *Water and the California Economy*.

[2] Hardin, Garrett. 1968. *The Tragedy of the Commons*. 162 Sci. 1243.

1. DEFINING SUSTAINABLE GROUNDWATER MANAGEMENT

Garret Hardin[2] called unlimited access to a natural resource, in which everybody can use the resource but no one is responsible for managing the resource, the tragedy of the commons. The result of the tragedy of the commons is that each party contributes by acting in their personal interest and maximizing their use of the resource, contributing to the depletion of the resource. Groundwater is one such resource. In an effort to avoid groundwater depletion, many communities are attempting to manage groundwater in a sustainable manner. Recent examples of definitions of groundwater sustainability typically include reference to not causing unacceptable damages or consequences for future users. [3] [4] Groundwater sustainability is defined by the USGS as:

"The development and use of groundwater in a manner that can be maintained for an indefinite time without causing unacceptable environmental, economic, or social consequences."[5]

In 2005, GRA[6] elaborated on the meaning of sustainability, where:
Groundwater sustainability means long-term protection and maintenance of groundwater quality and quantity for future generations. Unacceptable consequences that could result from poor groundwater management include:

- Overdraft, or depletion of the groundwater supply
- Increased extraction costs
- Well deepening or replacement costs
- Water quality degradation, including salinity intrusion
- Land subsidence
- Decreases in streamflow, and
- Environmental damage

Recommendation 1: **Adopt the USGS definition of Groundwater Sustainability. "The development and use of groundwater in a manner that can be maintained for an indefinite time without causing unacceptable environmental, economic, or social consequences."[7]**

2. STATEWIDE PRIORITIES FOR SUSTAINING GROUNDWATER RESOURCES

CASGEM ranks groundwater basins on the basis of population, population growth, number of public supply wells per square mile, total number of wells, irrigated

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[2] Hardin, Garrett. 1968. *The Tragedy of the Commons*. 162 Sci. 1243.

[3] GRA. 2003. *Developing, Managing and Sustaining California Groundwater Resources.* White Paper.

[4] National Ground Water Association. 2004. *Groundwater Sustainability*. White Paper.

[5] USGS. 1999. *Sustainability of Groundwater Resources*. USGS Circular 1186.

[6] GRA. 2005. *California Groundwater Management – A Resource for Future Generations.*

[7] USGS. 1999. *Sustainability of Groundwater Resources*. USGS Circular 1186.

acreage, groundwater reliance, documented impacts, and other miscellaneous information for the purposes of establishing priorities for groundwater monitoring needs. The CASGEM basin/subbasin prioritization is a good starting point for prioritizing basins/subbasins. However, many basin and subbasin boundaries, as defined in DWR Bulletin 118, are geopolitical and not based on true hydrogeologic boundaries (such as watersheds), so this factor and the fact that each area is unique needs to be considered in setting up new management entities (also see ACWA recommendation #2, CWF recommendation #2). DO NO HARM should apply to areas that have a working functional groundwater management structure, whether they cover an entire basin/subbasin or multiple subbasins. For example, some groundwater management plans (GMPs) cover more than one subbasin if they are watershed based (which should be considered the preferred hydrologic approach to defining groundwater management areas where appropriate).

The California Statewide Groundwater Elevation Monitoring (CASGEM) Basin Prioritization Process was completed last year. Basin prioritization findings indicate that 126 of California's 515 groundwater basins and subbasins are high and medium priority. Nearly all basins known to be in overdraft are in this category (nearly half). These basins account for 92% of California's annual groundwater pumping and supply 89% of the population that resides over groundwater basins. The remaining 388 basins are low and very low priority and comprise 75% of the groundwater basins in the State.

Some key areas for groundwater depletion include:

- Basins in the San Joaquin Valley, especially areas that have built out agriculture during the 20th century based on the promise of a reliable supply of northern California surface water deliveries that have in fact been reduced; many of these areas have chronically declining groundwater levels and have historically and/or recently experienced land subsidence.
- Coastal basins where agricultural and urban demands have outpaced recharge and created overdraft and seawater intrusion.
- Desert basins where agricultural and urban demand have outpaced recharge and created overdraft and increased salinity.
- Bedrock areas of the coastal ranges and Sierra Nevada that are vulnerable groundwater resources where agricultural and/or domestic demand has outpaced recharge and created overdraft, with many wells going dry.

Not all of the above listed areas fall into the current "medium" and "high" priority basin/subbasin designation. Additional factors that will need to be considered in a revised prioritization of groundwater resources include drought vulnerability and aquifer robustness/resiliency. Importantly, bedrock aquifers are currently not recognized by the Administration and Legislature as part of California's groundwater. Yet, 20 percent of all public supply wells are completed in bedrock aquifers, and a large portion of the rural domestic population relies on groundwater

resources as their sole source of water supply. More rigorous studies and data collection efforts need to be completed in coming years.

GRA concurs with CWF's and ACWA's recommendations to focus on subbasins identified by DWR as "medium" or "high" priority; and with ACWA's recommendation to also focus on unmanaged basins and subbasins. In addition, we recommend the following:

Recommendation 2: **Sustainability of statewide groundwater resources should be prioritized and ranked to include currently designated groundwater basins/subbasins and if appropriate other areas such as watersheds/subwatersheds. Areas of fractured bedrock aquifers should also be considered in the next five years for monitoring prioritization, and development of groundwater management elements and approaches appropriate for these areas of the state. This prioritization scheme should be used to prioritize actions and limited technical and economic resources for assistance.**

3. LOCAL GROUNDWATER MANAGEMENT ENTITIES

GRA agrees with CWF in their assessment of the need for local groundwater management entities (LGMEs) in recommendation #3, which is also addressed in ACWA's recommendation #5 on enhancing local/regional agency authority. One observation statewide is that many challenged groundwater management planning processes in the state do not have all stakeholder groups engaged. We further suggest the need for establishing a clear process for establishing adequate stakeholder representation as part of LGME formation.

Recommendation 3: **As part of the formation of an Local Groundwater Management Entity, (LGME), institute a process for establishing adequate stakeholder representation in the creation and governance of newly formed LGMEs.**

4. GROUNDWATER MANAGEMENT AUTHORITIES

GRA generally agrees with CWF (recommendation #4) and ACWA (recommendation #5) regarding improved and clear definition of local/regional groundwater management authority. GRA makes the following additional recommendations:

Recommendation 4**: A Water Resource Element shall be adopted in all City and County Plans to ensure improved coordination in planning decisions that can ensure sustainability of water resources. Local Groundwater Management Entities shall regularly provide impaired groundwater area maps to local planning agencies that identify areas of groundwater depletion and areas of groundwater quality degradation.**

5. GROUNDWATER MANAGEMENT PLANS

GRA generally agrees with CWF (recommendation #5) and with ACWA (recommendations #3 and #4) regarding the need for strong state-wide requirements for the adoption, implementation, and reporting requirements of groundwater management plans (GMPs).

The successful implementation of a GMP hinges, among other things, upon the following:

- Improved data collection, quality and accessibility.
- Water budgets that form the basis of understanding of the sustainability of basins and subbasins. Quantify all major inflows, outflows, water levels, and storage changes.
- Availability of groundwater management data needs, including:
  - High quality water well drilling and construction reports.
  - Comprehensive understanding of the basin hydrogeology which relies to a large degree on Well Drillers Logs.
  - Groundwater levels in discrete aquifer zones.
  - Water quality in discrete aquifer zones and in surface water.
  - Location, rate, and amount of groundwater extractions.
  - Surface water-groundwater interaction.
  - Precipitation and other meteorological measurements for water budget inflow and evapotranspiration calculation.
  - Land subsidence monitoring in areas of groundwater depletion.
  - Land use data for analysis and planning, including irrigated lands and crop types, as well as pervious versus impervious areas.
  - Comprehensive well inventory.
- Remote sensing data including aerial photography and Landsat imagery, color-infrared imagery, thermal imagery, GRACE, INSAR etc to provide continuous assessment of land use, land subsidence, and of crop or vegetation consumptive water use (evapotranspiration).

GRA makes the following additional recommendations:

Recommendation 5: **Groundwater Management Plans (GMP)**

- **A GMP should include continuous efforts to better define and understand water budgets, trends in groundwater use, recharge, storage, and discharge in the basin/subbasin, including surface water-groundwater interactions.**
- **The largest uncertainties in a typical groundwater budget are infiltration of precipitation and applied surface water (i.e. agricultural return water) , pumping distribution and amounts, infiltration of incidental water (i.e. septic systems, leaky pipes) and consumptive use of crops and natural vegetation. Appropriate measurement of these elements should be a**

mandatory part of establishing a groundwater budget in groundwater management plans.

- **GRA recommends adoption of ACWA's recommendation for annual summary performance reporting by LGMEs to DWR and five year comprehensive performance reviews of LGMEs (and their GMPs) by SWRCB (ACWA recommendation #3 g,h) as opposed to the 5 year only reporting requirements recommended by CWF (recommendation #5).**

6. STATE'S ROLE IN GROUNDWATER

GRA generally agrees with CWF recommendation #6 and the need for and specific recommendations of a "state backstop" (#6c-d), which is more specific than ACWA's recommendation #7. While CWF's recommendation #6 is focused on the state's role as a backstop, ACWA's recommendation #8 further identifies important state actions. In addition to these, GRA has identified additional important roles for the state and makes some additional comments and recommendations.

State Should Develop a List of Groundwater Basins and Subbasins Needing Corrective Action to Achieve Sustainable Groundwater Management

DWR has recently completed a comprehensive evaluation of the state's groundwater resources as part of the California Water Plan Update 2013, with a separate volume on California's groundwater in final draft review. GRA believes that DWR can identify those subbasins with significant sustainability issues including but not limited to chronic groundwater level declines, adverse impacts to groundwater dependent ecosystems, and noncompliant GMPs. Further, we believe that a constructive and effective interim step to the development of revised or new GMPs over the next five years would be to require all subbasins that are identified by DWR as having significant sustainability issues or non-complaint GMPs be required to develop a brief, concise Corrective Action Work Plan (CAWP) for submittal to DWR and SWRCB by June 2015. The Corrective Action Work Plan would be considered a work plan for the necessary steps to complete the required GMP in the basin/subbasin.

Recommendation 6: **Development of Corrective Action Work Plans.**

1. **DWR should be tasked with identifying and submitting to SWRCB basins and subbasins with significant sustainability issues including but not limited to chronic groundwater level declines, subsidence, adverse impacts to groundwater dependent ecosystems, at risk or degraded water quality, and noncompliant GMPs.**
2. **SWRCB to direct all those local agencies identified by DWR to develop and submit a Corrective Action Work Plan to SWRCB. The Corrective Action Work Plan would be brief and include:**
   - **Summary problem statement including groundwater depletion, water quality degradation, adversely impacted groundwater dependent**

ecosystems, non-cooperating local agencies, litigation issues, governance challenges, and technical and economic resource needs.

- **Request for technical assistance and resources to help address the problems.**
- **Action plan to address problems that may include, but not be limited to, revising or developing new GMP including the key elements to be added, instituting new governance structure based on legislation, or seeking administrative injunctive relief.**

3. **If a management agency in those deficient areas cannot or will not comply, or if a management agency does not exist, then the SWRCB will direct the DWR to intervene and prepare a CAWP for adoption and implementation by the state.**

Improved State Expertise and Integration Across State and Federal Agency Mandates and Roles in Groundwater Management

Considering the importance of the Administration's initiative to improve groundwater management, the need for maintaining a continuous stream of funding, and the need for substantially increasing technical support from the State for local groundwater management agencies, separate groundwater offices, divisions or units with designated staff and designated funding within both, DWR and SWRCB (and possibly within DFW) are needed to assure that sufficient resources are directed toward a successful and effective state role in groundwater management.

Furthermore, the State should support sustainable groundwater management through coordinated activities and actions including DWR, SWRCB, DFW and CalEPA. Multiple state agencies have different mandates and authorities related to groundwater resources protection and management. Some of these mandates overlap, are redundant, and become barriers to progress on improving groundwater protection. These state agency overlaps and conflicts should be resolved to remove barriers to sustainable groundwater management (also see ACWA's suggested policy objective #8 and CWF's recommendation #6f).

The state agencies should work more collaboratively with local and federal agencies to optimize existing information and funding to conduct the studies necessary to better understand, protect and manage groundwater resources statewide. This may require a paradigm shift for some agencies, as the State needs to foster a new era of cooperation, collaboration and finding new ways to optimize information and leverage limited resources. The newly created groundwater units within DWR and SWRCB will facilitate the integration of groundwater-related efforts across legal mandates (e.g., groundwater use and quality) and agencies, and between federal, state, and local levels.

Recommendation 7: **Set up "Groundwater" as a new Office, Divisions or Unit within DWR and SWRCB with designated staff and funding.**

Science, Education, and Outreach

Science forms the foundation for sound groundwater management, technical and policy decisions. Hydrogeologic characterization is a necessity and requires many scientific parameters to be identified, analyzed and quantified by experienced professionals. Water wells are a key information collection point but are expensive to install, test and collect data from, and therefore requires funding to obtain the basic data needs. Hydrogeology is a key factor that controls groundwater flow, and groundwater practitioners rely on information obtained during the drilling of wells and recorded on drillers' well construction reports filed with DWR and on geophysical electric logs to obtain basic data. California Professional Geologists or others with applicable knowledge and experience should be required to observe the drilling of all water wells and to complete and submit the detailed well drillers logs and electrical logs to the DWR instead of relying on the owner/driller, as too often incomplete, inaccurate, or missing reports have resulted. .

Measurement of large-scale groundwater extraction is necessary not only as an input to a water budget but also to inform the extractor of how much is being extracted, and if demand management is necessary, to measure how much to cut back.

Groundwater models are necessary in basins that are being actively exercised or depleted in order to develop the kind of long-term planning necessary to sustain surface and groundwater resources. For the development of such modeling tools, there is a need to resolve a number of issues including security of well locations and other information, and well log confidentiality. Additional information needed for modeling includes aquifer geometry, chemistry, recharge areas, and discharge areas.

Education, outreach, and facilitation are critical elements for the success of groundwater management plans and the stakeholder-driven efforts behind them. Stakeholders include a wide range of public and professional individuals, few of whom typically have training in groundwater science, groundwater management, or facilitation of stakeholder processes. The State should recognize the need for educating stakeholders and funding/programs should be made available that build improved local/regional/state capacities for groundwater management.

Recommendation 8: **The State should provide leadership and continue to work to better integrate across state and federal agency mandates and roles involving groundwater and water resources management, including**:

A. Communicate the value of water and groundwater resources to citizens
B. Communicate the need for conservation and resources protection
C. Adopt data collection, management, reporting, and availability standards

D. Assist local agencies in conducting a rigorous, statewide inventory of existing and abandoned wells and catalogue existing well construction features.
E. Improve the quality of information being collected during the drilling of wells
F. Map the aquifer systems of the state with appropriate naming conventions
G. Establish web portals to connect state databases and make state groundwater level and quality data easily accessible
H. Establish and host a Groundwater Management Steering Committee made up of federal, state, local agencies, academics, environmental and groundwater organizations to help guide implementation of Administrative and Legislative initiatives to improve groundwater management
I. Encourage and incentivize education, outreach, and facilitation support to the broad range of stakeholders involved in groundwater management planning efforts

We also strongly recommend adoptions of ACWA's detailed recommendations on GMP minimum requirements (ACWA recommendation #3), on DWR developing a groundwater management education framework (ACWA recommendation #4), and the enhanced role of LGMEs (ACWA recommendation #5). In addition, GRA specifically recommends:

Economy of Scale Efforts to Improve the Science of Groundwater Management

There are many tools and technologies available to help better understand water and groundwater resources and other inter-related natural resources challenges. Many of these tools and technologies such as the use of satellite imagery and radar and gravity, may not be cost-effective for a local agency but on a statewide scale may be economic.

***Recommendation 9*: DWR should work with other local, state, federal agencies and academia to develop an approach on what types of large scale efforts and studies which are "economy-of-scale" for DWR to pursue to support local groundwater management entities. These could include but are not limited to satellite imagery, use of remote sensing data for evapotranspiration estimates, GRACE, INSAR and GPS data for land subsidence, groundwater level change and subsidence monitoring.**

There is funding requested in a budget change proposal for updating DWR Bulletin 118 in the Governor's budget. Considering the Administration's initiative for improving groundwater management, and the need for optimizing limited resources, the State should assess what is needed in a new version of Bulletin 118. The State should consider how federal, other state, and local groundwater

management agencies would contribute to it, what is needed from Bulletin 118 in the next Water Plan update and schedule for it, and carefully craft a scope for a new version of Bulletin 118, including staffing and resources requirements that will meet future needs.

Recommendation 10: **The State should develop a detailed and updated plan for an ongoing, continuously funded, inventory and assessment of the State's groundwater resources (major updates to DWR Bulletin 118-California's Groundwater Resources).**

- **The inventory and assessment of the State's groundwater resources should be guided by a multi-agency, multi-organization State Groundwater Steering Committee.**
- **The inventory and assessment should be completed collaboratively, working with local, state, and federal agencies to collect all available information.**
- **The inventory and assessment should include status of groundwater resources, areas of depletion, areas of poor water quality, areas of vulnerable groundwater resources, status of hydrogeological understanding and monitoring, and identification of additional studies and monitoring needed.**
- **This inventory and assessment should address both alluvial systems as well as fractured bedrock aquifers systems being relied upon by communities.**

7. FUNDING FOR GROUNDWATER MANAGEMENT

GRA agrees with CWF's recommendation #7 and ACWA's recommendation #6 for development of a multi-source funding strategy. The importance of groundwater in California has been under appreciated for decades, and funding has never been sufficient to adequately study and understand the resource, let alone manage groundwater sustainably.

Recommendation 11: **The Administration and Legislature need to recognize the need for continuous funding for groundwater programs and provide the necessary funding for the studies, databases, and projects needed to meet sustainable groundwater management actions. This includes funding to adequately fulfill the State's role in groundwater management, as well as funding in the form of grants or low interest loans to assist local agencies in meeting sustainable groundwater management actions identified in the Administration's Initiative.**

8. NEED TO INCREASE GROUNDWATER RECHARGE AND STORAGE

GRA fully supports ACWA's proposed policy objectives #6 (increase groundwater storage) and #7 (remove impediments to recharge), and the recommendation that the State specifically remove impediments to water recharge and conjunctive use (ACWA recommendation #8). Specifically, GRA knows that there is a fundamental need in the state to increase groundwater recharge and storage to balance the water deficit and save for future droughts. There needs to be incentives to increase recharge (such as reduce red tape for recycled water and storm water recharge projects) and discourage actions that cause groundwater basin overdraft (such as unmonitored pumping). State agencies should work with tribes and federal, regional and local agencies on other actions related to promoting groundwater recharge and increasing storage, including improving interagency coordination, aligning land use planning with groundwater recharge, and identifying additional data and studies needed to evaluate opportunities, such as capturing and recharging stormwater flows and treated wastewater not used by other users or the environment. There should also be an effort to conduct a feasibility assessment for distributed groundwater storage and recharge using the State and federal water projects and conveyance.

***Recommendation 12*: Conduct a survey of existing operational and planned groundwater recharge projects and conduct a feasibility assessment for distributed groundwater storage and recharge using local, State and federal water projects and conveyance.**

Policy Recommendations		
ACWA	CWF	GRA Response
1. Enhance local management	No Policy Recommendations	1. Support.
2. Establish mandatory minimum GMP requirements and increased authorities		2. Support.
3. Avoid or minimize subsidence		3. Support but the objective needs to be to aggressively address subsidence, rather than "avoid or minimize." In some cases, when there is a more comprehensive understanding of the aquifer system and response of stresses to the system, aggressive recharge may be required to address continued subsidence subsequent to addressing depletion. Action - DWR (in collaboration with the USGS) should be charged with developing a statewide subsidence monitoring network.
4. Assess groundwater connection to surface waters		4. Support. Statewide effort should be made to fill data gaps and develop maps of groundwater surface water interconnections and groundwater dependent ecosystems. DWR and DFW should be charged with developing and updating these maps on the five year cycle of B-118 and the state Water Plan.
5. Improve data availability		5. Support. There needs to be an effort to make data more available.
6. Increase groundwater storage		6. Support. Distributed groundwater storage in conjunction with the federal, state and local projects should be developed jointly by federal, state and local agencies.
7. Remove impediments to recharge		7. Support. Additionally, we suggest that this include language relating to the need to increase recharge to help balance water budgets, to achieve basin management objectives, address chronic groundwater level declines, and achieve a

		surplus of groundwater in storage. Identify and remove impediments to increasing recharge.
8. Do no harm		8. Support. Existing successful groundwater management programs should not be affected by changes in law to improve groundwater management statewide.
9. Reassess surface water reallocation		9. Support, with clarification that SWRCB should work with local managers and review groundwater budgets in plans as part of surface water allocation decisions. Also should consider surface water-groundwater interconnections and how recharge may be affected.
10. Provide state financial and technical assistance		10. Support. State financial assistance should be provided with the commitment of locals to implement sustainable groundwater management programs and commitment to share data generated from the financial assistance provided. Technical assistance should be provided by DWR on a local basin in the following iterative manner: (i) first DWR should provide technical assistance where locals don't have the expertise or resources to do the technical analyses and help them identify what future resources will be needed, (ii) DWR should be charged with identifying a comprehensive scope of technical assistance that can be scale-leveraged statewide to local agencies. Examples include SEBAL for ET, demand and water budget estimates, INSAR, etc. DWR should also be charged with finding federal, local, academic and private partners to optimally accomplish the scope identified.
11. Provide a "backstop"		11. Support.

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RECOMMENDATIONS		
ACWA	CWF	GRA Response
1. Adopt definition of "sustainable groundwater management": no long-term economic, environmental, social harm	1. Adopt state definition of sustainable groundwater management: long-term benefits with no long-term economic, environmental, social harm	Support.
2. Prioritize unmanaged basins or subbasins	2. Develop a prioritized statewide program of sustainable groundwater management a. Groundwater subbasins (Bulletin 118) as groundwater management unit b. Focus on DWR medium and high priority basins c. DWR to consult with DFW to also include subbasins with ecosystems vulnerable to groundwater depletion d. Develop a process for subbasin boundary adjustment (DWR)	Support with clarification: not all basins and subbasins are equal and some have geopolitical boundaries versus geohydrological, therefore there may need to be some boundary modifications and consolidation of areas.
3. Adopt uniform minimum requirements for GMPs and implementation a. Actual groundwater subbasins (Bulletin 118) as groundwater management unit plan standards: SB 1938, including subsidence monitoring b. DWR medium & high priority basins: GMPs within 5 years c. Sustainability time frame: 20 years; planning horizon: 50 years d. Groundwater extraction prohibition for newly developed land (except single-family domestic wells) f. Technical review by DWR g. Performance reporting annually to DWR; data publication within standardized state database h. Performance review every five years by SWRCB	5. LGMEs must develop groundwater management plans (GMP) that describes how subbasin will achieve sustainable groundwater management a. Components required by SB 1938 – objective sustainable groundwater management b. DWR provides technical and financial assistance c. GMP within 4-5 years d. Progress reports every 5 years e. Sustainable BMO met within 20 years f. Low priority basins: later implementation g. LGME reports to SWRCB, which may ask DWR for audit	Support ACWA and CWF recommendations and further recommend: • Minimum requirements should be revisited to include large-scale pumpage metering and reporting (you cannot manage what you are not measuring) and precipitation monitoring. • Heavy lifting will be for state agencies to establish data collection, management and reporting standards and set up flexible data management framework and web portals for accessibility – requires leadership in Governor's office and resources.
4. DWR to develop best management practices guidebook using a robust stakeholder process, that at a minimum includes: a. Illustrative quantifiable basin management		Support. In addition, DWR to support broad education and outreach efforts to LGMEs, stakeholder groups through funding of collaborative efforts by

objectives (BMOs) b. Subbasin boundary adjustment c. Groundwater monitoring d. Well permitting (construction and abandonment) e. Groundwater recharge f. Sustainability indicators g. Overdraft measures h. Public review process i. Governance structures j. Data collection and reporting k. Demand management		state/federal agencies, universities, and NGOs.
5. Enhance local/regional agency authority a. Authority to collect groundwater management fees b. Authority to monitor extraction, use, and water levels and to allocate groundwater and limit extraction c. Well permitting (cooperatively or directly) d. New "summary proceeding" enforcement capability e. Require land use agencies to consult with groundwater management authority to protect recharge areas & receive "will serve" letter for new groundwater use f. County/city general plans to be consistent with GMP g. Expedited LAFCO formation assistance	4. State law should give clear groundwater management authorities and flexibility to LGME's to achieve sustainable groundwater management a. Measuring and reporting groundwater conditions b. Allocating groundwater and manage pumping c. Assessing fees d. Allowing and approving groundwater transfers e. Coordination with land use planning entities 3. Local groundwater management entities (LGMEs) should be established to manage groundwater subbasins: a. Entities delegate to authority or form a JPA or b. Entities organize through MOU or c. Citizens/entities form new entity through legislature d. Consistent state guidelines e. LGME is accountable for meeting goals of GMP f. Transparent decision-making, input from stakeholders g. LGMEs be formed within 2 years	Support ACWA and CWF recommendations: • An additional alternative could be for local entities to establish the need for a friendly adjudication and to move forward with a physical solution to take to the courts and request a Watermaster be appointed to manage the basin. • Add process for establishing adequate stakeholder representation as part of LGME formation and how all constituent groups will be represented by the newly formed LGME.
6. Ensure adequate funding	8. Funding for groundwater management a. Needed at local/regional and state level	Support. Funding for state DWR should be scoped out and

	b. Address Prop. 218 and other means c. New local and state taxes and fees for groundwater management d.Support for underserved communities	separated as groundwater management support.
7. Provide State "Backstop" Authority when Local Action has not occurred or has been Insufficient a. SWRCB holds hearing and invites all stakeholders b. Hearing results i. issue order with compliance schedule for completion and implementation of a GMP or ii. assign third party to develop and implement GMP iii. SWRCB fee for I & ii iv. SWRCB order for extraction reduction during plan development c. SWRCB hearing to develop protocol to address demand reduction to facilitate basin recovery d. SWRCB return control to basin as soon as possible	6. State role a. Technical assistance (DWR) b. Program oversight (SWRCB and DWR) c. Enforcement (SWRCB) d. Criteria and process for state intervention (SWRCB) e. Nature of state intervention (SWRCB): interim watermaster, administrative adjudication, emergency restrictions on pumping f. Regulatory relief / eliminate redundancies 7. Administrative Groundwater Adjudication Procedure a. For dispute resolution prior to and to avoid court actions b. SWRCB to administer and develop procedures c. SWRCB or LGME would appoint Administrative Law Judge d. Costs would be borne by parties to the dispute e. LGME to provide all data to ALJ f. ALJ would issue findings to SWRCB and LGME/or LGME, who would hold public hearing on result prior to any actions	Comment on ACWA Recommendation: Third Party assignment could be quite difficult if not impossible without a court order or full adjudication. Support DWR, DWR & SWRCB, SWRCB roles as CWF describes, with additional recommendation: • First step in State stepping in is to direct development of a 'problem statement & corrective action plan' by locals, locals and state jointly, or state. Support either ACWA or CWF form of state backstop, after refinements.
8. Remove impediments to water transfers, stormwater/recycled water recharge, conjunctive use		Agree removing impediments to transfers, stormwater and recycled water recharge and conjunctive use as long as ecosystems and groundwater quality are protected.

CALIFORNIA WATER FOUNDATION

Recommendations for Sustainable Groundwater Management:

Developed Through a Stakeholder Dialogue

May 2014

"GROUNDWATER IS ONE OF CALIFORNIA'S MOST IMPORTANT DROUGHT BUFFERS, AND CRITICAL TO A SUSTAINABLE WATER FUTURE"

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EXECUTIVE SUMMARY

Groundwater is critical to California's water supplies, accounting for about 40% of the water used in normal years and up to 60% of the water used during droughts.

Over 75% of Californians—as many as 30 million people—rely on groundwater for a portion of their drinking water. Groundwater resources are essential to the state's multi-billion dollar agriculture industry, as well as other sectors of the economy. Groundwater basins are found throughout the state and store billions of gallons of water, eclipsing the size of any of the state's other reservoirs. As California confronts one of the worst droughts in recorded history, it is critical to consider ways to protect this invaluable resource for the present and future health of California's farms, cities, and environment.

Managed correctly, groundwater provides a dependable and long-term supply of water for current and future generations. Groundwater can provide an essential buffer against droughts by providing additional water supplies in years when there is not enough rainfall or snow.

Unfortunately, in many parts of California groundwater is being pumped much faster than it is being replenished naturally or through methods involving infrastructure. Similar to the way a checking account works, when groundwater withdrawals exceed deposits, the result is an "overdraft." Overdrafting our groundwater leaves less water available during critically dry years, when farmers need it most. It causes conflicts between neighbors and deprives future generations of a vital resource.

As groundwater levels drop, the costs farmers and others must pay to retrieve that water can increase significantly. If enough of an overdraft occurs, the land can literally sink (called subsidence), causing significant damage to buildings and infrastructure, and leaving less room underground to store water in the future. In some cases, groundwater overdraft can result in significantly reduced water quality.

The solution to this problem is a consistent, statewide approach for *sustainable* groundwater management.

In January 2014 the Brown Administration released its *California Water Action Plan* that highlighted the importance of groundwater management at the local level. Shortly thereafter, the Brown Administration requested the California Water Foundation (CWF) to initiate a Stakeholder Dialogue ("Dialogue") and prepare a report to Governor Brown and the State Legislature with recommendations to achieve sustainable groundwater management. The Dialogue involved voices from agriculture, water agencies, under-represented communities, cities, environmental interests, and businesses throughout the state.

CWF is deeply appreciative of all who participated and shared their perspectives. The extensive outreach from the Dialogue highlighted a number of key findings that support and inform a statewide approach to achieve sustainable groundwater management:

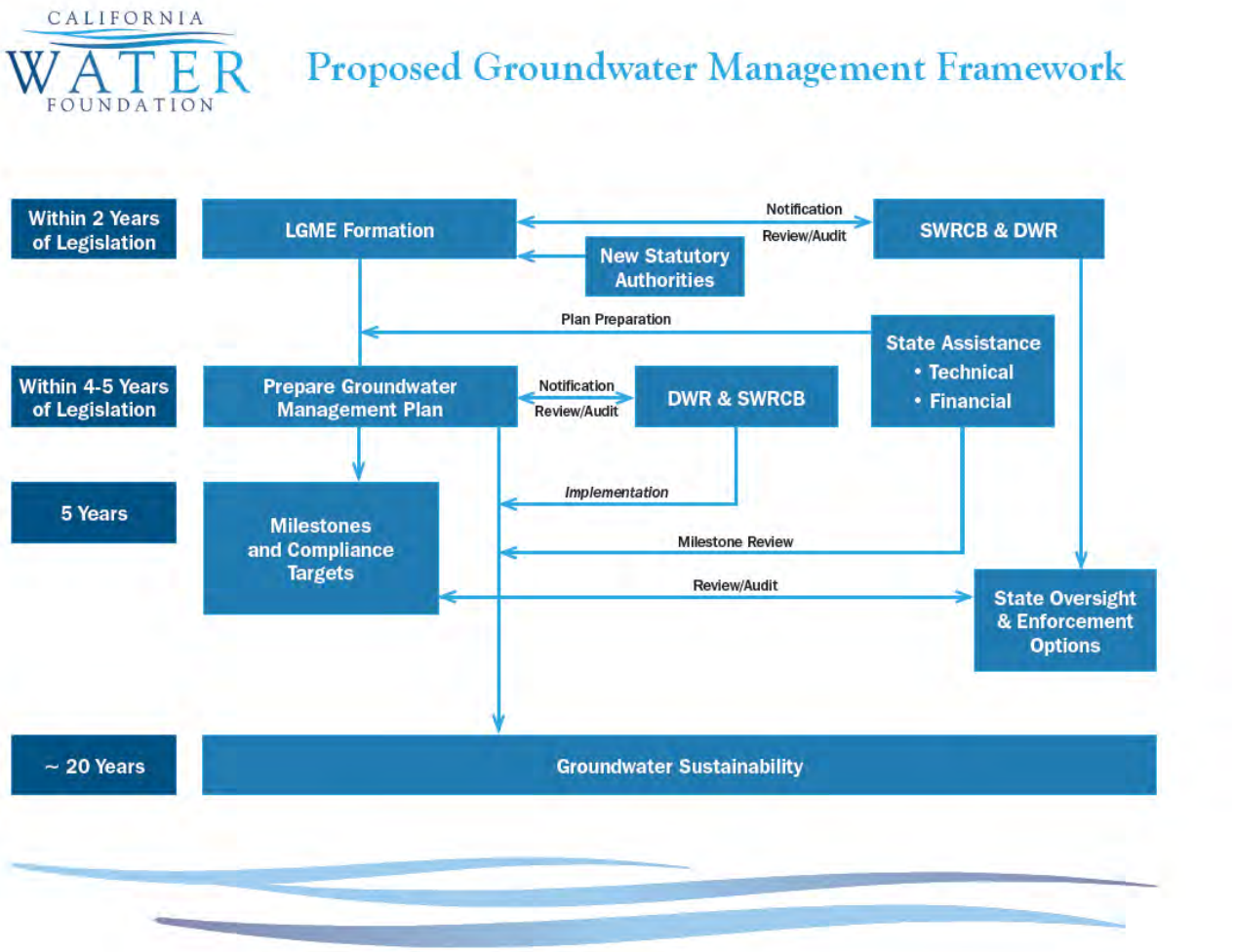
- Groundwater is essential to California's economy, environment, and public health and safety.
- Current groundwater trends are not sustainable.

- Groundwater is closely linked to surface water, and is part of an interrelated system of water infrastructure, management, and the environment.
- Groundwater is most effectively managed at a local and regional level.
- Local groundwater managers require better tools to do their jobs.
- Protection of private property and water rights is imperative.
- Clear and meaningful state roles are needed to protect state interests.
- Groundwater is an important source of drinking water.
- Correcting the problem will take time, but in many places time is of the essence.
- Funding is needed to support effective management.
- Access to information is important for management and citizen understanding.
- Comprehensive legislation is necessary to address the state's complex groundwater management challenges.

The Dialogue built on these findings to develop seven recommendations that provide a framework for California to protect and sustainably manage its groundwater supplies so they are available when needed most by California's residences, farms, businesses, and environment, today and in the future. CWF's recommendations are:

1. Adopt a definition of "sustainable groundwater management."
2. Develop a statewide program that establishes a system of prioritization for all subbasins.
3. Establish local groundwater management entities (LGMEs).
4. Provide LGMEs with tools and authorities to achieve sustainability.
5. Require LGMEs to develop management plans with benchmarks and milestones.
6. Establish a clear and coordinated state role for assistance, oversight, and enforcement.
7. Provide funding for groundwater management.

These seven recommendations constitute distinct elements of a complete and comprehensive program. CWF pledges to continue to work with the Brown Administration, the State Legislature, and the broad diversity of stakeholders interested in the sustainability of California's water resources, to further refine and implement this package of recommendations over the coming months.



This figure illustrates local and state roles and authorities within CWF's proposed groundwater management framework.

INTRODUCTION

The California Water Foundation (CWF) was established in 2011, as an initiative of Resources Legacy Fund, in an effort to move California to a more sustainable water management system for the benefit of farms, cities and the environment. This initiative stems from a fundamental observation that a wide range of stressors, including changing climate patterns, increasing population, aging infrastructure, and environmental degradation have reduced the water system's resilience and sustainability. CWF has invested in urban conservation, waste water recycling, flood plain management, stormwater capture, and a wide range of demonstration projects and stakeholder coalitions. As part of these investments CWF has consistently emphasized that integrated management of water resources, including groundwater, is essential to achieving resilience and long-term sustainability. California's groundwater resources provide a highly flexible supply that can be used to respond to drought, store wet-year water, and "fill the gap" when surface supplies are unexpectedly curtailed. Groundwater can be the centerpiece of a sustainable supply for farms, cities, and the environment, but only if it is effectively managed.

The *California Water Action Plan* released by the Brown Administration in January 2014 highlighted the importance of groundwater and the value of local management. In response to the Brown Administration's request for recommendations on groundwater legislation, CWF initiated a Stakeholder Dialogue ("Dialogue") process to prepare a report to Governor Brown and the State Legislature with recommendations to achieve sustainable groundwater management. Over the intervening eight weeks a wide range of knowledgeable people from around the state helped frame recommendations that reflect a primary local management role with clear targets, flexibility about local governance, a need for technical assistance and funding, and a meaningful state role in oversight and enforcement.

The results of this effort are organized and presented as follows in this Report:

- A review of the Dialogue process that provides additional details about participating stakeholders and their perspectives;
- A description of the background and challenges for California's groundwater management and current efforts to achieve measurable progress toward sustainable management;
- A set of key Findings; and
- A package of seven policy Recommendations intended to lead to a new state policy for meaningful, measurable improvement in groundwater management within realistic timeframes.

The Recommendations in this report reflect the best judgments of CWF about what is needed to achieve sustainable groundwater management while keeping decision making primarily at local and regional levels. CWF remains committed to a constructive public discussion about this critical issue and, ultimately, to meaningful legislative and policy actions.

STAKEHOLDER DIALOGUE PROCESS

PURPOSE OF DIALOGUE PROCESS

Over the past year California has seen the highest level of interest in groundwater management in nearly four decades. Problems with the current system of groundwater management are widely acknowledged, and discussions of possible solutions have been initiated in different forums. The Dialogue's objectives were to gather diverse input from knowledgeable stakeholders and members of the public about the context of the problem, develop and test ideas for improved management and reform, and ultimately develop a set of recommendations reflecting integration of key interests wherever possible. CWF sought participation from water agencies and associations, natural resource conservation advocates, environmental justice advocates, county representatives, representatives from the agriculture industry, farm bureaus, water quality advocates, and legislative and administrative officials.

Problems with the current system of groundwater management are widely acknowledged

The Dialogue did not pursue consensus-building towards unanimous agreement about solutions, but rather focused on identifying and understanding each stakeholder's full range of opinions, concerns, and ideas. Stakeholders provided critiques and recommendations based on their individual experience and expertise, but were not asked to formally represent their organizations or broader constituencies in order to maximize flexibility and openness in discussions and allow CWF to carry out an ambitious schedule.

DIALOGUE DETAILS

The Dialogue encompassed three distinct but related tracks, each intended to converge around preparation of this report. One track involved a Steering Committee of 13 stakeholders from a wide range of organizations, each having diverse expertise and perspectives (a membership list is in the Appendix). The Steering Committee members met in person three times over the course of six weeks (February 28, March 17, and April 9) at the CWF offices in Sacramento. Steering Committee members worked with each other and the CWF team to identify key issues, needs, potential solutions, and policy recommendations for the report. Steering Committee members reviewed a final draft version of the report in late April and provided comments to CWF in a series of individual telephone conversations.

A second but related track involved scheduling and conducting five Interest Group (IG) sessions, with one or more Steering Committee members participating in each session and assisting with identification of participants. The IG sessions were intended to extend the reach of the Dialogue and engage with knowledgeable stakeholders and organizations representing diverse geographies, economies, industries, and perspectives. The IG sessions were organized around conservation organizations, the environmental justice community, county representatives, agricultural groups, and water agencies. Each IG session offered options for in-person and remote participation via webinar and telephone. Each IG session also followed a consistent agenda and sought to explore the context for sustainable groundwater management in California and gather insight, feedback, and advice on approaches and solutions.

A third Dialogue track involved numerous one-on-one or small group meetings to address specific groundwater issues.

CWF found a notable level of convergence across the three tracks around the following concepts and proposals that are more fully developed in the Recommendations section of this report:

- Groundwater should be managed sustainably.
- Groundwater should be managed as part of a broader integrated approach that includes surface water, conservation, water quality, reuse, environmental stewardship, and other water management strategies.
- Groundwater should be managed at the level of existing subbasins and not based on political boundaries.
- Groundwater management is best accomplished at the local and regional level within a statewide framework.
- Groundwater management must respect private property and water rights.
- Water quality is an integral part of sustainable groundwater management.
- There is an important role for the state in providing technical assistance and carefully defined oversight.
- There is a need for continuous, reliable state, local, and regional funding as part of a plan for sustainable groundwater management.
- Groundwater management activities should be transparent and inclusive. Groundwater information should be publically accessible and management should incorporate meaningful stakeholder engagement.
- Land use decisions impact and are impacted by water management decisions. Better coordination is necessary while still respecting existing authorities.

CWF also found a diverse set of solutions proposed by stakeholders to address the following issues:

- The degree and adequacy of representation of disadvantaged communities affected by groundwater decision making.
- The relationship of new groundwater management authorities to the authorities of existing land use and water management entities.
- The potential role of the State Water Resources Control Board (SWRCB) in oversight and enforcement of a state groundwater program, including concerns about over-reaching, micro-management, and lack of appreciation for local challenges.
- The treatment of fractured rock aquifers that have different physical characteristics from alluvial aquifers and require different management approaches.
- The challenges associated with providing continuous and reliable funding for a state program and avoiding the creation of unfunded mandates.
- The potential for continued reductions in surface supplies from climate change and environmental protection to exacerbate groundwater overdraft and its impacts.

OTHER CONCURRENT PROCESSES

CWF's Dialogue benefited significantly from the Brown Administration's *California Water Action Plan* along with multiple additional groundwater management initiatives by the State Legislature, the Administration and SWRCB, and Association of California Water Agencies (ACWA).

- The Legislature held two oversight hearings, the first for the Assembly Committee on Water, Parks, and Wildlife on March 11, 2014 (entitled "Management of California's Groundwater Resources"), and the second for the Senate Committee on Natural Resources and Water on March 18, 2014 (entitled "Managing California's Groundwater: Issues and Challenges"). CWF leadership and several Steering Committee members testified at these hearings.
- The Administration held workshops on March 24 and April 16, 2014, to gather input on a groundwater legislative proposal as requested by Governor Brown. SWRCB separately prepared and received public comment on a "Groundwater Workplan Concept Paper" and held a public workshop on January 22, 2014.
- ACWA undertook an extensive groundwater management policy process in recent years and issued important documents in 2009 and 2011. ACWA released their more recent "Recommendations for Achieving Groundwater Sustainability" report on April 7, 2014.
- Links to other concurrent documents and processes may be found on SWRCB's website.

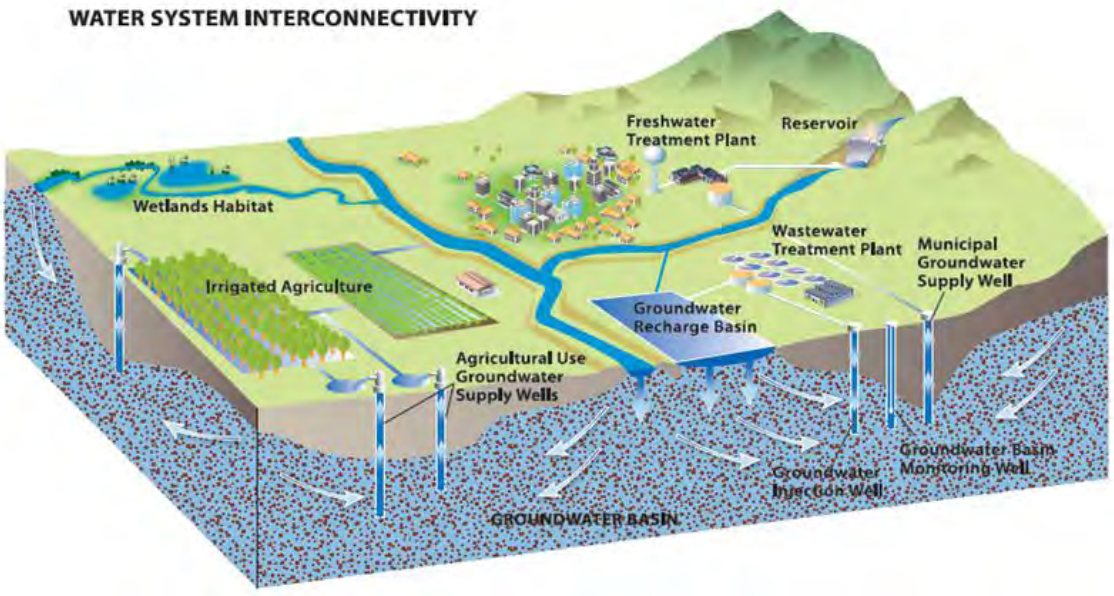
BACKGROUND AND CHALLENGES

Groundwater provides about 40% of California's water supply during an average year, and likely up to 60% or more during droughts such as this year. An estimated 30 million Californians, more than three quarters of the state's population, receives at least part of their drinking water from groundwater. Groundwater is critical to California's vibrant and diverse agricultural economy. The annual use of groundwater varies significantly depending on weather conditions and the availability of surface water supplies. Groundwater use in California is increasing, and demand is projected to accelerate in the future as the state's population surges from its current 38 million to over 50 million by 2049. Volatility of available surface water supplies due to the impacts of climate change and environmental protections is increasing pressure on groundwater. Some indications are that during this current drought groundwater may be providing 65% of the state's water supply.

Groundwater and surface water are closely interconnected parts of California's water management system, as shown in the illustration below. Groundwater use is affected by surface water availability, and surface water flow can be diminished by groundwater pumping. While groundwater issues must be addressed, that should occur within the context of the water system.

Groundwater is critical to California's vibrant and diverse agricultural economy

Finally, the physical, economic, and social dimensions of groundwater in California are remarkably diverse. The consequence is that management historically has been implemented at the local level. The unique characteristics of each place, and the local consequences of decision making, necessitate strong local authority and management. However, local jurisdiction is fragmented among different entities and does not correspond well to natural groundwater boundaries. The state also has a responsibility for managing this important resource to protect broad interests in the environment, economy, and public health and safety.



History of Groundwater Development in California

Groundwater was historically an abundant and accessible resource in California that played a fundamental role in the development of the state. Artesian wells were once abundant where the city of San Jose stands today and groundwater was critical to the initial development of agriculture in the San Joaquin Valley. Even after large surface water projects were built groundwater played a role as a buffer when surface supplies were limited, helping California farmers and cities weather the effects of the droughts that are a part of the state's natural climate.

In 1914 California adopted a legal framework that included a system for permitting and managing individual rights to surface water. A system for permitting groundwater was not a priority at that time, and that basic framework has been maintained to the present. As a result, overlying land owners are permitted to pump as much water as they can reasonably and beneficially use, and no one has responsibility or authority to keep track of that pumping. This contributes to significant fragmentation of water management: each pump operator can make decisions independent of the conditions in the basin or actions of other pumpers. When disputes among pumpers arise the primary avenue available to them usually is the courts. Judges may be asked resolve who has rights to how much water within an aquifer among thousands of pumpers. Twenty three basins, mostly in Southern California, have been adjudicated in this way. The advantage of these adjudications is that the overlying landowners have certainty and understanding about their groundwater rights. The price for that certainty is quite high, with proceedings taking as long as 20 years to resolve and requiring millions of dollars in fees for attorneys and experts.

In 1978, Governor Jerry Brown empanelled a Governor's Commission to Review California Water Rights Law (available on CWF web page). Although the authors were charged with exploring possible changes to the water rights system, they opted to retain the basic framework described above and address a few specific deficiencies rather than advocate dramatic changes. Notably, the Commission's proposed changes to groundwater management anticipate many of the recommendations outlined in this report.

Groundwater Management Issues

While groundwater management is a complex subject involving experts in geology, engineering, economics, and ecology, the primary management task boils down to a simple concept of balancing long-term supply and demand. Groundwater basins are like shared bank accounts. These accounts are closely tracked in some subbasins. In other subbasins, however, withdrawals are not monitored or measured.

The result over time has been overdraft in many subbasins. The University of California Center for Hydrologic Modeling estimates that between 2003-2010, the state's groundwater overdraft averaged almost 2.5 million acre-feet per year, and more than triple that amount (nearly 8 million acre-feet per year) in 2012 (a dry year) and 2013 (a critically dry year). This overdraft is, in many respects, a "tragedy of the commons:" the accumulation of what could be viewed individually as benign actions, i.e., small amounts of pumping, that has broad impacts extending beyond individual pumpers.

Chronic overdraft of groundwater resources has potentially devastating consequences, including:

Land Subsidence - Groundwater pumping creates the potential for deformation of the land surface, leading to a sinking or settling of the land known as subsidence. Some of the more costly consequences of subsidence include:

- Increased coastal and inland flooding
- Reduced conveyance capacity of canals, aqueducts, and flood bypass channels
- Damage to buildings, roads, bridges, pipelines, levees, wells, and other infrastructure
- Development of earth fissures, which can damage surface and subsurface structures and allow for contamination from the surface to enter shallow aquifers

During the 1960s and 1970s, parts of the Central Valley experienced a drop of more than 25 feet due to groundwater pumping. Occurrences of land subsidence have been discovered in many areas across the state, costing billions of dollars to the federal and state government, farmers, irrigation districts, and local agencies to repair. Subsidence continues in many of these areas as discussed in "Land Subsidence from Groundwater Use in California" *LSCE, Borchers & Carpenter* (2014), sometimes at near historically high rates.

Increasing energy costs – Overdraft has caused groundwater levels to drop hundreds of feet in certain areas of the state. As groundwater levels drop, water users must pump from greater depths, increasing energy used to operate pumps and thereby increasing costs and greenhouse gas emissions.

Water quality degradation - Overdraft can damage water quality through a variety of mechanisms. It can allow saltwater intrusion, as has occurred in Pajaro Valley, the Central and West Coast Basins, and elsewhere, or draw in adjacent plumes of pollution. The interconnection between surface water and groundwater means that contamination in one may migrate to the other. Ironically, by over pumping groundwater to meet a current need, water users may be contaminating the aquifer and effectively reducing their future groundwater supplies.

Streamflow depletion impacts on surface water rights and ecosystems - Many aquifers naturally release water into surface water bodies. When groundwater is depleted the aquifer may instead draw from adjacent or connected surface water bodies like lakes, rivers, streams and wetlands; this reduces streamflows and lake levels. Streamflow depletion impacts surface water right holders, degrades aquatic habitats and harms the flora and fauna that depend on these habitats. For example, partly due to groundwater overdraft, the lower Cosumnes River recently has been completely dry throughout most of the salmon migration period and impacting surface water flows into the Delta.

The recommendations will allow California's diverse groundwater users and managers to balance supply and demand, protect private property rights, and meet the future needs of farms, cities, and the environment

MOVING FORWARD

Groundwater is a critical component of California's water system and its sustainable management is vital to present and future generations. Historic challenges with sustainable management are complicated by a growing population, a more volatile and uncertain climate, uncertainty around surface water deliveries, and changes in land use practices. This Report's recommendations are organized around a clear goal of sustainable management and support for effective local management within a state framework. The recommendations will allow California's diverse groundwater users and managers to balance supply and demand, protect private property rights, and meet the future needs of farms, cities, and the environment.

KEY FINDINGS TO SHAPE CHANGE IN GROUNDWATER MANAGEMENT

CWF's extensive outreach has revealed a high level of interest and sense of urgency for addressing groundwater management challenges. The effectiveness of groundwater management varies widely throughout the state, with some basins being managed sustainably while others suffer chronic overdraft and even land subsidence. As noted earlier in this report, groundwater use without broadly effective management has become a classic example of a "tragedy of the commons" or a "race to the bottom." There is general agreement that all parts of the state would benefit from better tools and authorities to effectively manage the resource and that a statewide framework can provide a clearer path to groundwater sustainability. CWF's assessment also shows a need for a delicate but clear balance between local empowerment and management and state engagement. However, there is a surprising level of agreement that groundwater can and should be managed at the local level within a statewide framework.

The following key findings have emerged from the Dialogue and should be considered in developing a groundwater management strategy.

Groundwater is essential to California's economy, environment, and public health and safety. There is broad appreciation for the important role of groundwater in the economy and environment. Groundwater is an effective drought buffer, providing great flexibility in the face of volatile surface water supplies. It is also an integral part of the conjunctively managed long-term water supply in many areas. However, the long-term increase in overdraft and its associated problems put the economy at risk and threaten the health of ecosystems. Climate change and reduction in surface supplies as a result of environmental protections magnifies these threats and increases the urgency of adopting improved authorities and tools to support sustainable management.

Current groundwater trends are not sustainable. Numerous groundwater subbasins are experiencing accelerated groundwater level decline, renewed subsidence, impacts to surface water supplies, and reduced water quality. Other subbasins that lack programs to monitor groundwater and management structures to support sustainable use are at risk of experiencing these same problems. Demand is hardening as a result of new developments and the conversion from annual to perennial crops. Surface supplies are less and less certain due to climate change, market competition, and regulatory changes, which results in increased reliance on groundwater. These trends, if they continue, could lead to significant economic, social, and environmental harm.

Integrated water management is necessary. It is artificial and unreasonable to think about the management of groundwater separately from other parts of the water system. Changes to surface water supply allocations and diminished reliability are driving many water users toward an increasing reliance on groundwater. Effective groundwater management will require improvements to many other aspects of water management in order to increase the supplies available for recharging groundwater basins, or to use in lieu of groundwater supplies such as surface storage, water use efficiency, and water recycling. Barriers to recharging groundwater basins, ranging from surface water rights to public health concerns over the water quality of waters to be recharged, have inhibited more integrated water management. While the state wrestles with proposals to improve groundwater management, local, state, and federal leaders need to consider and make adjustments to interrelated components of water management and infrastructure to move wet-year water into groundwater storage for use during drought conditions.

Groundwater is most effectively managed at the local and regional level. California's 515 groundwater basins and subbasins are not uniform in their physical, social, economic, and political characteristics. These differences are significant and include the nature and availability of other water resources, composition of local economies, and governance arrangements for water resources. Local groundwater management that is consistent with a set of clear state guidelines is likely to receive support and achieve progress. Local management plans can be tailored to reflect local conditions based on local knowledge. State guidelines should accommodate a range of governance arrangements and provide a range of tools for use by Local Groundwater Management Entities (LGMEs).

Local groundwater management entities (LGMEs) require better tools. While some local agencies have done remarkably well with the limited authorities available, the increasing demand for groundwater and continued overdraft in key subbasins require a more focused approach to sustain groundwater resources and prevent conflict. While over 200 groundwater management plans (GMPs) have been established under current law, the long-term overdraft of groundwater in key areas of the state has continued. Creation of such plans has been a positive step, but there is a critical lack of compliance and enforcement authorities and tools for local entities. Adjudicated basins and special act districts have demonstrated successful management, but arriving at those outcomes has proved costly and can take significant time to implement, sometimes decades. In the case of adjudication, courts play a significant role in ensuring enforcement. Better authorities and tools at the local level are needed to support better management.

Better authorities and tools at the local level are needed to support better management

Protection of private property and water rights is imperative. While California water law is complex and the system of correlative rights for groundwater cannot be fully addressed in this Report, it is important that the effort to improve groundwater management respect and protect private property and water rights. In fact, one of the most persuasive arguments for improving the current management system for groundwater is to prevent the exercise of one person's rights from infringing on the exercise of another's. Better understanding of the physical elements of groundwater basins and clearer authorities for management and resolution of disputes can contribute to greater certainty over and protection of individual rights to groundwater.

Clear and meaningful state roles are needed to protect state interests in groundwater management. Most GMPs created under current law include only limited tools to address growing demand for groundwater. The current drought increases both demand and the potential for conflicts. A clear statewide framework with adequate local tools and authorities, combined with state assistance, monitoring, oversight and appropriate enforcement, can buttress good management intentions and improve prospects for achieving sustainability.

Groundwater is an important source of drinking water. An estimated 30 million Californians, more than three quarters of the state's population, receives at least part of their drinking water from groundwater. Effective management is critical to protect and maintain both the amount and quality of those supplies.

Time is an important factor. Overdraft conditions that are the result of decades of overpumping will require significant time to bring into balance. Uncertainty around climate and surface water supplies may extend those timeframes. To be effective, a groundwater management program

should provide sufficient time for the formation of LGMEs that reflect local conditions. It should also provide sufficient time and resources to support development of local GMPs with measurable objectives. In order to ensure progress toward sustainability, however, plans and objectives should include clear timeframes and deadlines.

Funding is needed to support sustainable groundwater management. LGMEs will require funding to prepare and implement GMPs. State agencies will need funding to provide technical assistance, oversight, and enforcement to support sustainable groundwater management. Funding also will be needed to support infrastructure construction, including facilities for conjunctive water management. A funding strategy that is reliable and continuous, and includes multiple sources at the local and state levels, is needed.

Access to information is important for management and citizen understanding. Good, reliable data is vital for local, regional, and state management decisions. It is also vital for explaining groundwater's role in the water system and the fundamental importance of groundwater to the state's economy, public health, and environment. There is a clear need for collection and access to useful information to ensure transparency about how decisions are made and funds are used. There must be greater two-way engagement with interested stakeholders and representative governments around establishment of management objectives, development and implementation of GMPs, and achievement of goals and objectives.

Comprehensive legislation is necessary. Existing fragmented management and limited authorities are insufficient to address the complex groundwater management challenges. A comprehensive package of authorities and standards is necessary.

RECOMMENDATIONS

THE SEVEN RECOMMENDATIONS IN THIS SECTION ARE THE KEY ELEMENTS OF A SUSTAINABLE GROUNDWATER MANAGEMENT PROGRAM. THEY ARE:

1. ADOPT A DEFINITION OF SUSTAINABLE GROUNDWATER MANAGEMENT
2. DEVELOP A PRIORITIZED STATEWIDE PROGRAM COVERING ALL SUBBASINS
3. ESTABLISH LOCAL GROUNDWATER MANAGEMENT ENTITIES
4. PROVIDE LGMES WITH SUFFICIENT GROUNDWATER MANAGEMENT AUTHORITIES
5. REQUIRE LOCAL SUSTAINABLE GROUNDWATER MANAGEMENT PLANS
6. ESTABLISH A CLEAR AND COORDINATED STATE ROLE FOR ASSISTANCE, OVERSIGHT, AND ENFORCEMENT
7. PROVIDE FUNDING FOR GROUNDWATER MANAGEMENT

WHILE EACH RECOMMENDATION ADDRESSES A DISTINCT ELEMENT OF THE PROPOSED PROGRAM, THE ELEMENTS ARE INTERRELATED AND SHOULD BE CONSIDERED AS A SINGLE PROGRAM AND POLICY PACKAGE.

EACH RECOMMENDATION INCLUDES A RATIONALE, A DISCUSSION, AND CWF'S UNDERSTANDING OF THE RANGE OF VIEWS, INCLUDING SUPPORT AND CONCERNS, EXPRESSED BY STAKEHOLDERS DURING THE DIALOGUE PROCESS.

RECOMMENDATION #1: ADOPT A DEFINITION OF SUSTAINABLE GROUNDWATER MANAGEMENT

Recommendation: It should be the policy of the state that groundwater be managed sustainably, and state law should adopt the following definition for sustainable groundwater management to serve as the primary objective for local GMPs in each subbasin:

> Sustainable groundwater management means the management of a groundwater subbasin to provide for multiple long-term benefits without resulting in or aggravating conditions that cause significant economic, social, or environmental impacts such as long-term overdraft, land subsidence, ecosystem degradation, depletions from surface water bodies, and water quality degradation, in order to protect the resource for present and future generations.

Rationale: *A clear definition of sustainable groundwater management that is capable of meeting the economic, environmental, and social needs of each subbasin is an essential element of the foundation for a statewide program. In recognition of the tremendous geographic and economic diversity of the state, this definition avoids prescribing numeric criteria that would apply to all subbasins but instead provides LGMEs a basic framework to follow. This definition is proposed to help address the variety of unique challenges around the state, and to prevent future problems in other regions (as described in the Background and Challenges section). The definition of sustainable groundwater management should be subject to further refinement to develop clear standards and criteria for application in groundwater management plans (GMPs) and to provide opportunities for full consideration of potential impacts.*

Discussion: The concept of "safe yield" is the basis for many managed groundwater basins, including adjudicated basins. Safe yield is generally defined as the maximum quantity of water that can be withdrawn from a groundwater basin over a long period of time without developing a condition of overdraft. It is intended to maximize pumping by focusing on depletion of groundwater storage. However, safe yield typically has not addressed other factors such as water quality, land subsidence, ecosystem impacts, and surface water depletions.

In contrast to safe yield, determining sustainable yield involves understanding all components of a subbasin, including the total water entering and leaving, and changes in the amount of water stored in the subbasin including connections to surface waters. An accounting of this type is commonly called the "water budget." Human activities such as groundwater withdrawals for municipal and irrigation purposes, and rainfall and other groundwater recharge activities, must be accounted for in the calculation of a subbasin's water budget and corresponding sustainable yield. Sustainable yield must avoid adverse impacts to in-stream beneficial uses and also address impacts to groundwater quality.

Range of Stakeholder Views: CWF is aware of the following views regarding this Recommendation.

- Stakeholders from diverse constituencies support the need to clearly define sustainable groundwater management in order to provide a consistent and fair standard across subbasins.
- Stakeholders from diverse constituencies support a definition of sustainable groundwater management that addresses impacts of groundwater overdraft including subsidence,

reduced surface water availability and reliability, diminished water quality, and aquatic ecosystem degradation. A workable definition must balance the need for clarity and precision with flexibility to accommodate local conditions and future change, and also allow time to effect change.

- The term "significant impacts," and the characterization of impacts to be avoided generally, was a concern of some stakeholders. Developing meaningful definitions of these impacts is an important step that should be addressed in rulemaking.
- There is broad appreciation of the shortcomings of the safe yield concept, along with understanding that it is the basis for current management in adjudicated basins. Sustainable yield provides for greater integration and was generally supported as an approach to improve management. However, some stakeholders lean toward safe yield because it is a standard that has been used and is understood by groundwater managers, including its limitations.
- Some stakeholders prefer a definition with greater specificity about species recovery, including specific benchmarks to protect current beneficial uses. Others oppose any increase in specificity and are generally concerned about increasing the focus on ecosystems.
- Many stakeholders acknowledge a linkage between groundwater management and water quality, but there is a range of views about how best to achieve diverse policy and regulatory objectives.

RECOMMENDATION #2: DEVELOP A PRIORITIZED STATEWIDE PROGRAM COVERING ALL SUBBASINS

Recommendation: A program for sustainable groundwater management should apply to all groundwater subbasins. However, implementation priority should be based on the priorities identified by the Department of Water Resources (DWR) in the California Statewide Groundwater Elevation Monitoring (CASGEM) groundwater basin prioritization (December 2013 draft).

- The subbasin boundary as identified in DWR's Bulletin 118 is the appropriate boundary for groundwater management.
- The CASGEM prioritization criteria and rankings should be used for determining the sequence of implementation of a sustainable groundwater management program. Any basin with a low or very low priority, while still included in the statewide program, should have the option to extend LGME formation and GMP creation by up to 10 years, unless there is a finding of a significant, imminent threat to the state's interests related to groundwater in that basin.

A statewide system that covers all groundwater basins is necessary to ensure uniformity and fairness throughout the state

- DWR should coordinate with the Department of Fish and Wildlife (DFW) to incorporate criteria into its CASGEM prioritization system to address subbasins that include species and ecosystems that may be particularly vulnerable to existing or future groundwater conditions. The determination of such species and ecosystems should be based on clear guidelines and criteria.

- DWR should develop a process to modify basin boundaries in order to facilitate improved management consistent with reasonable hydrologic criteria.

Rationale: *A statewide system that covers all groundwater basins is necessary to ensure uniformity and fairness throughout the state. However, there must be a clear prioritization of basins to better focus resources and allow lower priority areas additional time. By maintaining an umbrella policy that applies to all subbasins, there will be less chance of problems migrating from a managed region to an unmanaged region.*

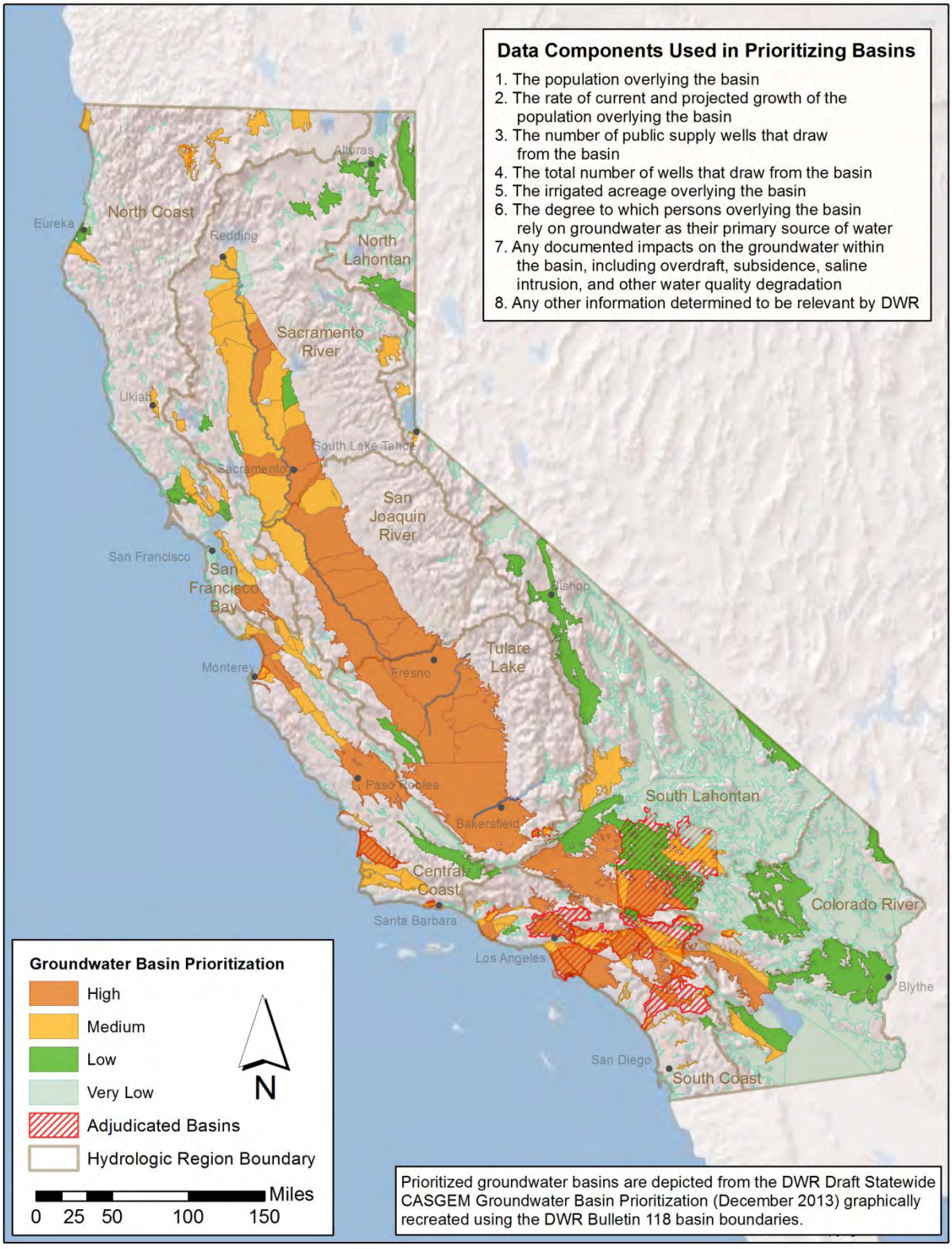
Discussion: This recommendation builds on prior legislative priorities and extensive work done by DWR to identify, characterize, and prioritize groundwater subbasins across California. It focuses on the subbasins in DWR's Bulletin 118 to ensure a consistent statewide policy. The CASGEM prioritization rankings (see CASGEM map p. 16), although still in draft form at this time, are part of this recommendation because they provide a clear system of identifying which basins are of highest priority in the state and are possibly threatened by present or future increases in groundwater demand. DWR anticipates updating these priorities at five-year intervals.

Current Bulletin 118 boundaries were identified by DWR as an appropriate basis for groundwater management in its 1980 report to the Legislature. Bulletin 118 was last updated in 2003. The 515 basins and subbasins included in the bulletin are identified on the basis of geological and hydrological conditions and, when practical, consideration of political boundaries. Bulletin 118 does not include all groundwater in the state, i.e., it excludes fractured bedrock areas that are located in many areas of the Sierra foothills.

DWR advised the Legislature that groundwater boundaries "can provide a basis for groundwater management." The Water Code already requires Bulletin 118 boundaries to be used in GMPs and urban water management plans.

DWR has extensive information about the characteristics and conditions of each groundwater basin in its Bulletin 118 database. The CASGEM monitoring system, as established in response to 2009 legislation, prioritizes all groundwater basins in one of four categories based on eight explicit criteria.

Because the state's resources are limited, attention should be focused initially on those highest priority basins (46 high priority and 80 medium priority basins) under CASGEM's rankings for 2013. It is important to include all basins in a statewide management program, but it would not be effective to treat all basins as an equivalent priority. The program should have a mechanism to review and accept existing basin management approaches that are effective and not disrupt what is working. Basins that are largely undeveloped and facing no current or near-term risks in the foreseeable future should be treated as lower priorities and subjected to relatively fewer requirements.


Data Components Used in Prioritizing Basins
1. The population overlying the basin
2. The rate of current and projected growth of the population overlying the basin
3. The number of public supply wells that draw from the basin
4. The total number of wells that draw from the basin
5. The irrigated acreage overlying the basin
6. The degree to which persons overlying the basin rely on groundwater as their primary source of water
7. Any documented impacts on the groundwater within the basin, including overdraft, subsidence, saline intrusion, and other water quality degradation
8. Any other information determined to be relevant by DWR
Alturas
Eureka
North Coast
Redding
North Lahontan
Sacramento River
Ukiah
South Lake Tahoe
Sacramento
San Joaquin River
San Francisco
San Francisco Bay
Bishop
Tulare Lake
Monterey
Fresno
Paso Robles
South Lahontan
Bakersfield
Central Coast
Colorado River
Santa Barbara
Los Angeles
Blythe
San Diego
South Coast
Groundwater Basin Prioritization
High
Medium
Low
Very Low
Adjudicated Basins
Hydrologic Region Boundary
N
Miles
0 25 50 100 150
Prioritized groundwater basins are depicted from the DWR Draft Statewide CASGEM Groundwater Basin Prioritization (December 2013) graphically recreated using the DWR Bulletin 118 basin boundaries.

Range of Stakeholder Views: CWF is aware of the following views regarding this Recommendation.

- There is broad support for the use of Bulletin 118 subbasin boundaries as they best reflect geologic and hydrologic boundaries at the appropriate scale for management, even though there are some flaws where the boundaries follow political lines.
- There is broad support for a single statewide program for sustainable management as long as it includes an acceptable system of prioritization, does not create problems where current management is effective, and does not impose significant new requirements where problems are not occurring or likely to occur. This program should extend to subbasins that have benefited from "happenstance" rather than effective management, with appropriate differences in benchmarks and schedules. Some stakeholders suggested that adjudicated basins and existing Special Act Districts could be "certified" as consistent with the program and report at regular intervals to maintain certification. These basins potentially could serve as examples of successful management practices for other subbasins.

There is broad support for focusing attention on high and medium priority basins and setting benchmarks and other requirements that reflect a sense of urgency

- There is general support for a principle of "do no harm" in cases where subbasins are being effectively managed. A state program should be structured consistent with this principle. Some stakeholders predicted that subbasins currently under effective management will prefer to be left alone.
- There is broad recognition of the differences in watershed and subbasin conditions across the state. These differences should be accommodated in a single statewide program, and stakeholders generally agree that a "one size fits all" approach is not desirable.
- There is broad support for focusing attention on high and medium priority basins and setting benchmarks and other requirements that reflect a sense of urgency.
- There is broad support for inter-basin coordination, particularly from subbasins whose neighbors are creating problems that cross boundaries. This coordination is more likely to be achieved through a single state program that applies to all subbasins, with appropriate differences based on prioritization and other factors.
- There are differences in views about how to address low and very low priority basins. Some stakeholders are comfortable with an extended timeframe so long as action eventually is taken; others prefer not to set any requirements until there is a measurable negative change in conditions.
- Some stakeholders expressed concern about situations where a subbasin may be excluded from prioritization despite a significant threat to surface water supplies and reliability in the near term.

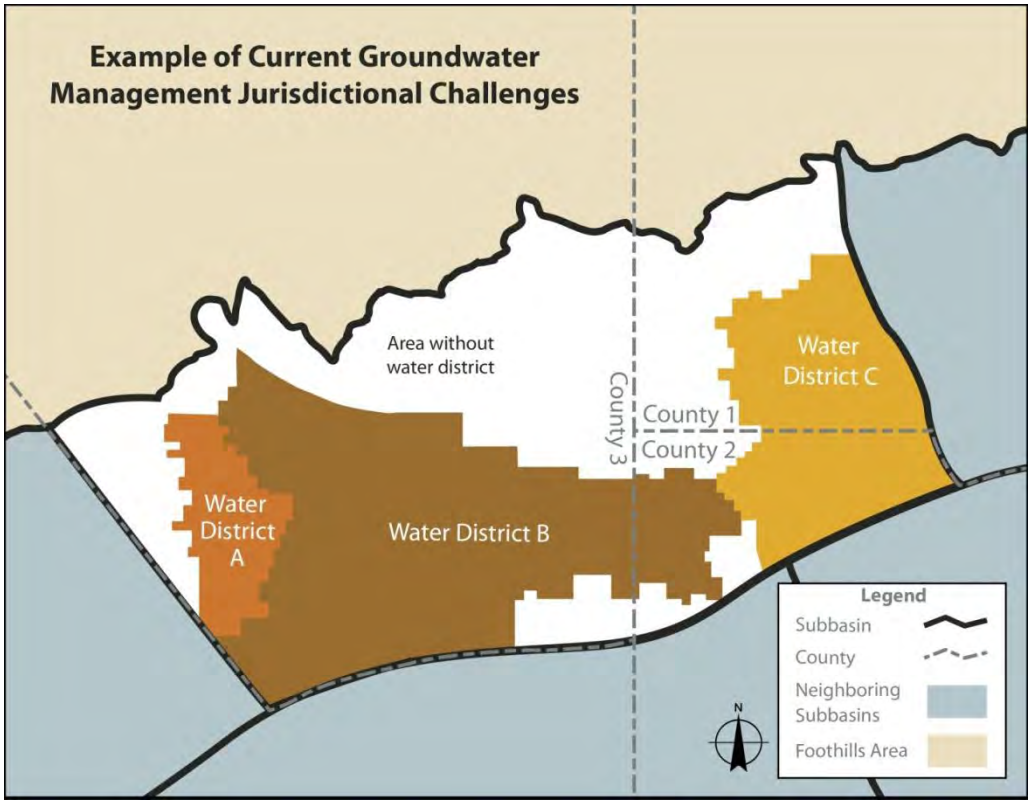
Recommendation #3: Establish Local Groundwater Management Entities

Recommendation: The state program should require that LGMEs be established to manage groundwater subbasins, as follows:

- Once an LGME is formed consistent with state guidelines and the state is notified, the LGME (and implementing agencies) should have access to the full set of tools and authorities provided by the program (Recommendation 4).
- The LGME is accountable for meeting the goals of the GMP and meeting the goal of sustainable groundwater management.
- Local decision-making by LGMEs should be transparent and reflect input from stakeholders and advisory committees as appropriate.
- LGMEs should be formed within two years of the legislation's effective date. Interested parties from within the subbasin or in an adjacent subbasin may appeal the consistency of formation with state guidelines within a specified timeframe.

LGMEs should be formed through any of the following mechanisms, to allow flexibility in meeting local needs and interests about appropriate governance structures while promoting accountability for achieving program goals.

1. Existing entities may organize and coordinate through formation of a Joint Powers Authority (JPA) , to form a single LGME.
2. Existing entities may organize through a formal agreement, such as an MOU, which identifies a single LGME to develop the GMP, and clearly defines roles and responsibilities of each implementing agency in achieving sustainability goals under the GMP.
3. Under the Special District Act, citizens may petition the legislature to form a new agency that may serve as an LGME. New authority should also be created allowing citizens to form a new public agency through an administrative process, similar to the Groundwater Management Agency Act, as described by the *Governor's Commission to Review California Water Rights Law* (1978).



This example illustrates the challenge of effectively managing groundwater subbasins with multiple entities and overlapping jurisdiction. CWF's recommendations would lead to a single GMP and coordinated management for the subbasin.

It is particularly important that the guidelines for LGME formation accommodate existing management entities, arrangements, and activities that have already achieved sustainable groundwater management or are likely to achieve that goal under current practices.

This recommendation should be subject to further refinement to develop clear standards and criteria for application in groundwater management plans (GMPs) and to provide opportunities for full consideration of potential impacts. The state's role in developing criteria for LGME formation and reviewing local plans and progress reports is discussed in Recommendation 6.

Rationale: *This Recommendation supports a comprehensive and effective set of solutions to California's groundwater problems by reaffirming and establishing a primary role for local knowledge, experience, and governance structures. This approach is consistent with the existing emphasis on local water management institutions while reducing fragmentation within a subbasin. The Recommendation emphasizes local management of subbasins and provides flexibility to respond to local conditions. It avoids mandating new levels of government and promotes consistency through basic guidelines applicable to all subbasins to avoid gaps in management.*

Discussion: Historically, groundwater management has been fragmented among local, regional, and state entities due to differing authorities over water uses, water resources, geography, and land use. In some cases groundwater has not been managed at all. There is a need to have a designated

groundwater management entity that has clear and unambiguous authority to achieve sustainable groundwater management. This recommendation would address that need.

The Legislature chose to promote local groundwater management when it passed AB 3030 in 1992 and SB 1938 in 2002, codified in Water Code §§ 10750-10756. Empowering LGMEs is the most practical way to achieve effective local management. Groundwater managers and users have recognized that each groundwater subbasin is unique and functions differently based on local conditions such as hydrology, geology, land use, governance, and political will. Because locals have the detailed knowledge and expertise to address these conditions, groundwater management primarily governed and implemented by a state authority would be infeasible. A key component of this Recommendation is to allow regions, with public input, the flexibility to determine the best governance structure for groundwater management.

There is a need to have a designated groundwater management entity that has clear and unambiguous authority to achieve sustainable groundwater management

To address the significance of time, LGMEs must be established within two years of the effective date of legislation. The state should intervene if this timeline is not met, as described in Recommendation 6.

Where a subbasin is adjudicated or falls within the jurisdiction of an existing special act district for groundwater management, a LGME should be deemed to have met the requirements of this section if its plans and activities are generally consistent with this program. In other subbasins with an existing groundwater management plan, an existing entity could be designated the LGME under this recommendation so long as other requirements are satisfied.

Range of Stakeholder Views: CWF is aware of the following views regarding this Recommendation.

- Stakeholders from diverse constituencies support the basic approach described in this Recommendation.
- There is broad support for allowing local flexibility in forming LGMEs and avoiding a one-size-fits-all prescription.
- There is strong interest in local autonomy among some stakeholders, accompanied by confidence that local decision makers provided with the right authorities and resources will manage groundwater sustainably without a need for primary state involvement.
- There is significant concern among some stakeholder constituencies about a lack of local political will to sustainably manage groundwater. This could emerge through failure to form an LGME, to prepare a GMP, or to meet sustainability goals. These stakeholders would support a flexible, local approach to groundwater management that includes the potential for appropriate state support and, if necessary, intervention.
- There is broad understanding among stakeholders about the importance of protecting existing property rights and water rights as part of LGME formation.
- Transparency in LGME formation and decision-making is an important interest for some key constituencies. This interest includes public access to information and is discussed further under Recommendation 5.

- There is a range of stakeholder views about diversity of representation in LGMEs. Some stakeholders feel strongly that a broad range of interests and values should be guaranteed in setting guidelines for representation, including but not limited to public health, the environment, and disadvantaged communities. Others feel that existing local approaches to formal representation should be respected. There is frustration among some stakeholders over past uses of outside advisory panels or committees as a way of expanding participation, based on negative experiences with IRWM and other programs. One approach suggested by some stakeholders is to amend existing JPA law to expand the types of organizations permitted to participate.

There is broad support for allowing local flexibility in forming LGMEs and avoiding a one-size-fits-all prescription

- Some stakeholders pointed out that two years may not be sufficient time if Local Area Formation Commission involvement is required under state law.

RECOMMENDATION #4: PROVIDE LGMES WITH SUFFICIENT GROUNDWATER MANAGEMENT AUTHORITIES

Recommendation: State law should provide clear and unambiguous authorities to LGMEs that enable them to achieve sustainable groundwater management. LGMEs have the option to utilize a range of authorities depending on local circumstances. These LGME authorities should include:

- Measuring and Reporting on Groundwater Conditions. The LGME should have the authority to require monitoring and reporting of data needed for effective groundwater management planning, implementation, and enforcement. This authority should include reporting of groundwater withdrawals, groundwater use, and groundwater elevations. CASGEM and other state groundwater monitoring programs should be integrated with any new authorities to measure and report on groundwater conditions.

The LGME should have the authority to require monitoring and reporting of data needed for effective groundwater management planning, implementation, and enforcement

- Allocating Groundwater and Managing Pumping. The LGME should have sufficient authority to allocate the beneficial use of groundwater and control pumping within a subbasin to achieve sustainability goals and resolve conflicts between property rights. One concept currently under development that may facilitate groundwater allocation is the establishment of an administrative adjudication process under the direction of the LGME and/or the SWRCB.
- Assessing Fees. The LGME should have the authority to assess fees to pay for costs of organizing, planning, and implementing its GMP (Recommendation 8).
- Allowing and Approving Voluntary Groundwater Transfers within Subbasin Jurisdiction. The LGME should have authority to approve transfers. This authority should work in conjunction with allocation and pumping control authorities to provide flexibility to find physical solutions.
- Enforcement. The LGME should have clear authority to enforce compliance with a GMP, including enjoining actions and imposing penalties.

Land use planning should remain under the jurisdiction of counties and cities but greater coordination and collaboration is necessary. The collaborative effort should focus on integration of and consistency of the GMP with:

- updating the General Plan and zoning ordinances;
- evaluating groundwater-intensive land use proposals; and
- issuance of well permits

Rationale: *This Recommendation is structured to give a LGME clear authority and flexibility to identify and utilize the most effective management tools to achieve groundwater sustainability, while respecting property rights and water rights and maintaining an efficient system of management. There are currently diverse interpretations of available authority. In the face of this uncertainty, local entities have been limited in their management of groundwater, particularly with respect to pumping. Clarifying these authorities would give LGMEs the tools they need to effectively implement sustainable groundwater management.*

Discussion: Authority to manage groundwater has historically been fragmented and uncertain between different types of entities and levels of governance. The groundwater subbasins that have been the most successfully managed are those where authorities have been consolidated into one entity that manages all groundwater in the subbasin. Special act districts such as the Orange County Water District and the Santa Clara Valley Water District have effectively managed the overdraft problems in their subbasins through several of the authorities listed in this section, such as pricing and measurement. Other groundwater subbasins have been adjudicated, with courts authorizing groundwater governing bodies to oversee the rights and actions taken to manage according to the terms of each adjudication. These entities that have effectively managed their groundwater basins frequently have use the authorities listed in this Recommendation. Efforts to control or allocate water rights are taken to protect the rights of one set of property owners from the exercise of another's rights.

Outside of special act districts and court adjudication proceedings, the authorities listed have not been consolidated into a general groundwater management law that grants these historically successful authorities to a specific type of governing body. Legislative acts such as AB 3030 and SB 1938 omitted some of these key authorities or instituted them with such a high bar to implementation that they have not yet been tested. This approach recommended in this Report empowers a LGME with the clear and necessary authorities listed in this Recommendation to achieve sustainable groundwater management.

Range of Stakeholder Views: CWF is aware of the following views regarding this Recommendation.

- Stakeholders from diverse constituencies support the basic approach described in Recommendation 4. As with other recommendations, stakeholders support local flexibility to decide which authorities to employ so long as sustainability is the goal.
- There is broad recognition among stakeholders that the authorities in AB 3030 are not strong enough to effectuate meaningful progress toward sustainable management.

- The greatest concerns with local groundwater management authority focused primarily on Recommendation 3 regarding the organization, representation, and transparency of LGMEs. There was general consensus that once the appropriate LGME was formed, that entity would need stronger and clearer authorities.
- Some stakeholders have doubts about the willingness or capacity of LGMEs to use new authorities and tools without the potential for state enforcement.

  Some constituencies are likely to resist specifying any authority to control pumping as part of sustainable groundwater management.
- Some stakeholders are concerned that LGME authority to approve groundwater transfers will be used to facilitate inter-basin transfers and prefer that this authority be limited to approving intra-basin transfers as part of a conjunctive management program.
- As noted elsewhere, stakeholders generally appreciate that private property rights must be respected in the exercise of local authorities.
- Local land use agencies expressed a concern that imposing restrictions to be consistent with a GMP might be viewed by some as a "taking" of private property, and raised the possibility of indemnification against such a claim.
- Some stakeholders emphasized the importance of having experienced water and groundwater managers exercising new authorities for LGMEs.

Recommendation #5: Require Local Sustainable Groundwater Management Plans

Recommendation: Each LGME should be required to develop a Groundwater Management Plan (GMP) that describes how that entity will achieve sustainable groundwater management in each subbasin within its jurisdiction.

- A GMP should include the components currently required and commonly referred to as SB 1938 plans (Water Code § 10753.7). The objective of the GMP should be the achievement of sustainable groundwater management through demonstrated, measurable progress. In addition, the GMP should contain the following:
  - Discussion of the geographic boundaries (Recommendation 2) with related mapping of features that impact groundwater management.
  - Identification of physical interactions and impacts across subbasin boundaries that reflects coordination with adjacent subbasins.
  - Subbasin water budget, model, water supply, and demand forecast; and a plan for long-term basin sustainability that addresses long term overdraft, water quality, subsidence, surface water flows, and groundwater dependent ecosystems.
  - Interim milestones and final targets with measurable thresholds that demonstrate progress toward achieving sustainable groundwater management should be identified for each objective component of the Plan (the interval for each milestone should be no longer than every five years).
  - Description of water management strategies for achieving sustainability of the groundwater subbasin, including how the groundwater management is part of a

broader integrated approach that includes surface water, conservation, reuse, and other water management strategies.

  - Other components that the LGME may require in order to meet sustainable groundwater management objectives, including those items listed in Water Code § 10753.8.

- DWR should provide technical and financial assistance in the development of local GMPs.
- A local GMP should have the following performance dates for high and medium priority subbasins (Recommendation 2):
  - The GMP should be completed and published within four to five years of the effective date of legislation.
  - Progress reports should be required every five years to identify progress made towards five-year interim milestones identified in the GMP.
  - Final achievement of sustainable groundwater management objectives should be reported and evaluated no later than 20 years from the date of plan adoption.
- LGMEs for low and very low priority subbasins should have the option to prepare GMPs up to ten years later than the requirement for high or medium priority subbasins. Milestones and final targets should be correspondingly adjusted. As noted in Recommendation 2, this option should be subject to a finding of a significant, imminent threat to the state's interests related to groundwater in such a subbasin.
- The LGME should report to SWRCB that its GMP meets the required criteria. SWRCB should have the authority to request DWR to review selected GMPs to ensure they meet criteria for a sound and credible plan that meets sustainability milestones and targets over the 20 year period. An interested party from within the subbasin or an adjacent subbasin should have an opportunity to formally challenge the compliance of a GMP with program requirements.

Rationale: *The GMP is the primary mechanism for achieving sustainable groundwater management. The new components listed in this Recommendation are identified to ensure that there is sufficient time for a LGME to prepare and implement the plan to achieve sustainability, and to work in an integrated manner with other local management entities in a subbasin. The milestones, targets, and progress reports are required to ensure that progress is being made throughout the 20 year implementation period, and to help the LGME identify any changes in information or conditions that would require revisions to the GMP.*

Discussion: Although impacts can sometimes come on quickly, groundwater generally responds slowly to changes in management, particularly when trying to arrest declines or achieve recovery in aquifers. It is therefore important to have clearly defined but flexible milestones for measuring performance toward achieving the goal of sustainable groundwater management.

This Recommendation lists elements that should be required in GMPs. The basis for these elements is grounded in the requirements of previous legislation (SB 1938, Machado 2002), codified in Water Code §§ 10753.7 – 10753.8. New requirements have been added to track progress in meeting sustainability objectives. GMPs should include measurable targets to track performance within discrete time periods. For high and medium priority basins, a reasonable time period is five years. With measurable milestones and targets and progress reports, GMPs will be periodically updated to

respond and adapt to unforeseeable changes in conditions. Where changes in conditions significantly affect the course of action identified in the plan, extensions can be requested to revise target timeframes. GMPs and progress reports would be made publically available. Opportunities for the state to provide time extensions are identified in Recommendation 6.

Range of Stakeholder Views: CWF is aware of the following views regarding this Recommendation.

- There is general agreement among stakeholders that regions will need significant time and resources to develop and implement sustainable GMPs. There is concern that imposing short timeframes to meet sustainability objectives in subbasins facing serious overdraft or other significant groundwater problems may cause economic harm or missed benchmarks. It will take time to get through the complex process of planning, data development, and adoption of new water management strategies.

There is general agreement among stakeholders that regions will need significant time and resources to develop and implement sustainable GMPs

- Some stakeholders advocate linking GMPs to Urban Water Management Plans required under state law.
- There is broad agreement that a GMP needs to be substantive and act as a real instrument for implementation actions. Stakeholders expressed a range of views about the relative importance of reporting requirements for different criteria such as water quality or subsidence.
- There is general support for local GMP development and adoption, followed by notification to the state. There are different views about the relative level of state oversight to ensure compliance of GMPs with program requirements, although likely greater agreement about focusing oversight on high priority subbasins. While local flexibility to select management measures is critical, stakeholders generally agreed that GMPs should have specific milestones to reach sustainability and targets for eliminating overdraft.
- There is interest among some stakeholders in having the flexibility to "merge" or integrate existing groundwater management plans that may cover only a portion of a subbasin into a single GMP. One option could be the use of "units" within a GMP.
- Stakeholders offered a range of views about the collection and reporting-including public access-of groundwater management data. There appears to be broad support for collecting and making available basic information in aggregated form. There are significant differences about the collection and reporting of information for individual wells. Some stakeholders seek the public release of individual well data, which would require changes to current law. Others strongly oppose any such change. Public access to data and assumptions incorporated into models is also important for some stakeholders. In addition, some stakeholders advocate for more frequent reporting of basic GMP information, possibly through annual "progress updates" prepared and issued by LGMEs.

RECOMMENDATION #6: ESTABLISH A CLEAR AND COORDINATED STATE ROLE FOR ASSISTANCE, OVERSIGHT, AND ENFORCEMENT

Recommendation: The state should support sustainable groundwater management through coordinated activities by SWRCB and DWR in four areas: technical information and assistance, program oversight, enforcement, and regulatory relief. These activities are addressed below in separate recommendations. The state's important role in providing financial assistance is addressed separately in Recommendation 7.

Recommendation 6.a: Technical Assistance. DWR should have primary responsibility for management of groundwater information that can track progress of groundwater basins statewide, and to support LGMEs in implementation of sustainable groundwater management. This includes

Technical Assistance to LGME's should include but not be limited to, gathering and analyzing data, developing and implementing GMPs, monitoring, and measuring progress toward GMP milestones and goals, inter-basin coordination, subbasin characterization, water budgets, modeling, , and monitoring.

- DWR should develop a list of Best Management Practices (BMPs).
- Technical assistance should be prioritized initially among high priority subbasins.
- Statewide data management should include but not be limited to:
    - Reporting on statewide groundwater basin status based on a compilation and assessment of the data from GMPs and progress reports, and
    - Establishment of a subsidence monitoring and assessment program, in coordination with the U.S Geological Survey, to avoid potential costly impacts of subsidence. This includes development of new data in targeted regions, and coordination of existing fragmented data.

Recommendation 6.b: Program Oversight and Compliance. SWRCB and DWR should work cooperatively and share data to oversee compliance with program benchmarks and targets.

- SWRCB and DWR should create and manage their respective information systems but share data to support program oversight.
- LGMEs should submit required notifications and reports to the state on:
    - LGME formation
    - GMP development and adoption
    - Progress towards milestones every five years, and
    - Achievement of final goals and objectives identified in the GMP
- DWR should review and analyze LGME reports and prepare summary analyses for SWRCB regarding compliance with program requirements, including progress toward sustainable management. DWR should also coordinate with SWRCB regarding the need for and nature of enforcement actions, as described below.

- SWRCB, in coordination with DWR, should establish standards and procedures, to support evaluation of compliance with program requirements, and progress toward sustainable management,. This should include:
    - Setting standards to guide subbasin notification of LGME formation and GMP adequacy, as well as an auditing process to evaluate compliance with program requirements.
    - Setting monitoring requirements, including data collection, acceptable metrics and methodologies, and reporting frequency, to track groundwater quantity and quality milestones and targets outlined in Recommendation 5.

Recommendation 6.c: Enforcement. SWRCB should have clear and unambiguous authority to enforce compliance with program requirements, and should be required to establish clear procedures for exercising this authority. A LGME (or entities in a subbasin) should have sufficient opportunity to satisfy program requirements, and appropriate support including technical assistance, before any enforcement action by SWRCB.

- SWRCB should take enforcement action after making a finding of non-compliance in coordination with DWR.
- SWRCB should have authority to adjust or permit exceptions to program requirements due to extraordinary local economic conditions, for emergency protection of public health and safety, or to address other extraordinary circumstances.
- SWRCB procedures should include an opportunity for a LGME (or management entities in a subbasin) to request a hearing regarding a proposed finding of non-compliance by SWRCB. Procedures should also include a formal process to appeal a SWRCB finding of non-compliance. Procedures should further include an opportunity for third parties from within a subbasin or in an adjacent subbasin to request a finding by SWRCB of non-compliance with critical program requirements.
- To the extent practical, SWRCB enforcement actions should promote the state's interest in sustainable local groundwater management. Enforcement actions should be proportional to the nature and consequences of non-compliance and gradual in the extent of state intervention. The following is one example of gradual enforcement:
    - Targeted technical assistance from DWR as appropriate
    - Notice of Noncompliance by SWRCB to region or LGME
    - Appointment of an interim water master to assist with the formation of an LGME, development of a GMP, or implementation of a GMP, until such time as the water master formally reports to SWRCB that future compliance is likely
    - Institution of emergency restrictions on new or existing wells, or other actions that address an immediate threat to public health or safety.
- In addition to these enforcement actions, proposals are being explored that would establish an administrative adjudication process managed by the SWRCB in conjunction with LGMEs. Such a proposal could reduce the time and cost of allocating groundwater resources.

SWRCB should have the flexibility to respond to unique local circumstances in its enforcement actions.

Recommendation 6.d: Regulatory Relief. A new regulatory groundwater management program should be structured to eliminate redundancies with other related programs, including reporting of groundwater levels. Reporting requirements should be streamlined to minimize burdens on LGMEs. SWRCB, in coordination with DWR, should have responsibility for identifying and implementing regulatory streamlining and efficiency.

Rationale. *These Recommendations describe a state role that primarily supports local groundwater management through technical assistance. The state's oversight and enforcement role is intended to create incentives to meet local-level program requirements, with enforcement being a final step. There is extensive flexibility available to respond to local conditions. This approach reflects the state's historic preference for local management of water resources, but addresses shortcomings in previous programs by providing a credible enforcement role. The recommendations also encourage coordination and integration at the state level.*

Discussion. Current state programs to promote effective groundwater management are inadequate. Many subbasins lack basic data and resources to adequately characterize groundwater resources, an essential first step in effective groundwater management. In addition, SB 1938 requires submittal of groundwater plans as a condition of receiving state grant funding, but it stops short of tethering credible state oversight to concrete milestones and targets to achieve groundwater sustainability. As a result, many basins that meet SB 1938 requirements nevertheless continue to be impacted by overdraft conditions. A mix of state support and effective oversight and enforcement is necessary to encourage improved management and achieve measurable progress.

The recommendations follow a pragmatic path in relying on notification of LGME formation and GMP adoption—without time consuming state reviews—in order promote timely management. DWR and SWRCB will develop procedures to review GMPs in order to promote broad compliance. SWRCB should look first at the least intrusive enforcement actions to encourage local progress.

SWRCB should have the discretion to choose from a suite of possible enforcement actions in those instances where the LGME falls short of the measurable thresholds outlined in its GMP. SWRCB should first look to the least intrusive enforcement actions to improve local progress.

Distinct roles for DWR and SWRCB, coupled with coordinated program management, are intended to draw on each agency's strengths, build confidence in the program at the local level, and identify opportunities to eliminate redundancies with current programs and regulations.

Range of Stakeholder Views: CWF is aware of the following views regarding this Recommendation.

- While there appears to be support for DWR's role in providing technical assistance, limited oversight, and funding, some stakeholders and their constituencies expressed strong resistance to meaningful oversight and enforcement by SWRCB. The reasons for this resistance are varied: preference for absolute local control, lack of confidence in evenhanded enforcement, and general resistance to any steps that could result in reduced pumping are a few.

- Some stakeholders expressed concern that SWRCB enforcement measures (e.g., bans on new wells or land use limitations) could have a severe impact on local economies and development opportunities. Others suggested such measures are necessary options in some subbasins to promote timely shifts in behavior. Some groundwater users expressed strong concern that SWRCB will intervene prematurely, before a LGME has had sufficient opportunity to meet milestones, or that intervention will not be proportional or respectful of local management efforts and practical challenges.
- There is general agreement that state oversight should not include "micromanaging" local decisions – GMP development and implementation should be left up to LGMEs, with state intervention only in the event goals are not met.
- There is broad support for periodic and transparent reporting to the state as a means to track subbasin, regional, and statewide progress towards sustainable groundwater management.
- Stakeholders expressed support for maintaining a distinction between non-regulatory (DWR) and regulatory (SWRCB) functions, while recognizing the need for credible coordination and "crosstalk" between the two state entities. At the same time, there is a fairly broad expectation that joint implementation will be challenging. Some stakeholders propose creation of a new state entity or office to oversee the program, but the majority appear to harbor strong doubts about that approach.
- There is strong support for incorporating incentives such as regulatory relief, technical assistance, and reporting flexibility for subbasins that are in balance in order to reduce local resistance to implementation.

There is general agreement that state oversight should not include "micromanaging" local decisions – GMP development and implementation should be left up to LGMEs, with state intervention only in the event goals are not met

RECOMMENDATION #7: PROVIDE FUNDING FOR GROUNDWATER MANAGEMENT

Recommendation: The state should develop and implement a multi-source funding strategy to support state and local activities for sustainable groundwater management.

- Funding would be used at the local and regional level to create LGMEs, develop GMPs, carry out activities under GMPs to achieve sustainability goals, and conduct reporting and monitoring, and to construct, operate, and maintain conjunctive groundwater management facilities including recharge basins.
- Funding would be used at the state level to allow DWR and SWRCB to provide technical assistance to local and regional entities and LGMEs based on prioritization; to gather, analyze, and disseminate program information; to regularly update Bulleting 118; and to carry out oversight and enforcement activities in support of sustainable groundwater management.
- A funding strategy should account for current, widely recognized challenges to funding local and regional groundwater management, including but not limited to Proposition 218.
- If a 2014 water bond proceeds, local assistance funding is needed to support the significant new GMP development and implementation activities associated with the sustainable

groundwater management program. In particular, funding is needed to support groundwater storage projects and associated infrastructure to convey surface water to recharge facilities.

- New local and state fees and taxes to pay for groundwater services are needed. All LGMEs should have local fee authority and the authority to measure and monitor water use to implement a fee system if they choose. Opportunities for coordination of funding among different programs should be identified as part of the state strategy.
- Funding is necessary to support the meaningful participation of underserved communities who have a stake in the management of groundwater subbasins and should be included in both state funding mechanisms and local funding programs.

A funding strategy should account for current, widely recognized challenges to funding local and regional groundwater management, including but limited to Proposition 218

Rationale: *Designing and implementing an effective statewide program for sustainable groundwater management requires funding for a range of activities including planning, monitoring, and construction and operation of physical facilities. LGMEs require continuous reliable funding sources. There currently are significant challenges to relying on water service fees or taxes at the local level for most subbasins. One of these is Proposition 218's requirement for "proportionality" of fees to services; another is the requirement for support from a two-thirds majority of voters for a tax increase. There is no obvious single source of funds to pay for groundwater management. A multi-source funding strategy that leverages existing federal and state funding sources and methods, addresses Proposition 218, and develops new funding sources is needed. Without such a strategy, local and regional groundwater management cannot succeed on a statewide scale.*

Discussion: It is beyond debate that sustainable groundwater management requires funding support for a wide range of activities. This point is made clearly in the recent SWRCB concept paper for groundwater management.

There are important differences in the authorities available to special act districts (of which there are 14) and adjudicated basins (of which there are 23) to raise funds for groundwater management and the vast majority of other groundwater entities, and other basins, around the state. Special act districts are authorized to regulate pumping and at least six have adopted pumping fees that reflect diverse approaches and pricing. However, each such district's ability to charge fees is potentially limited by its legislation: while some districts use tiered pricing, others believe they lack such authority. Management entities in some adjudicated basins charge replenishment fees for pumping in excess of court-ordered quantities, again with pricing variations. Some opportunities to trade pumping among users of adjudicated basins also exist.

It is estimated that over 200 GMPs have been prepared since AB 3030 was adopted in 1992. The prevailing view is that AB 3030 does not grant sufficient authority to other groundwater entities to adopt local fees to support groundwater management, and few, if any, local entities have adopted such fees. Local taxes can be used to support groundwater management but must satisfy the constitutional requirement of a two-thirds majority of voter support. Proportional cost restrictions in Proposition 218 are a challenge to satisfy for fee-based models. A recent appellate court opinion in *Griffith v. Pajaro Valley Water Management Agency* may provide a reliable legal foundation for adopting groundwater service fees but it is difficult to predict at this time.

The state has provided some funding to address management needs. The Public Policy Institute of California (PPIC) estimates that between 2000 and 2012, DWR made approximately $350 million in grants and low interest loans to local entities for groundwater storage. A SWRCB list of current funding sources from the water boards and other agencies includes DWR's Integrated Regional Water Management grants program and Local Groundwater Assistance programs.

There is no shortage of ideas for raising funding for local groundwater management:

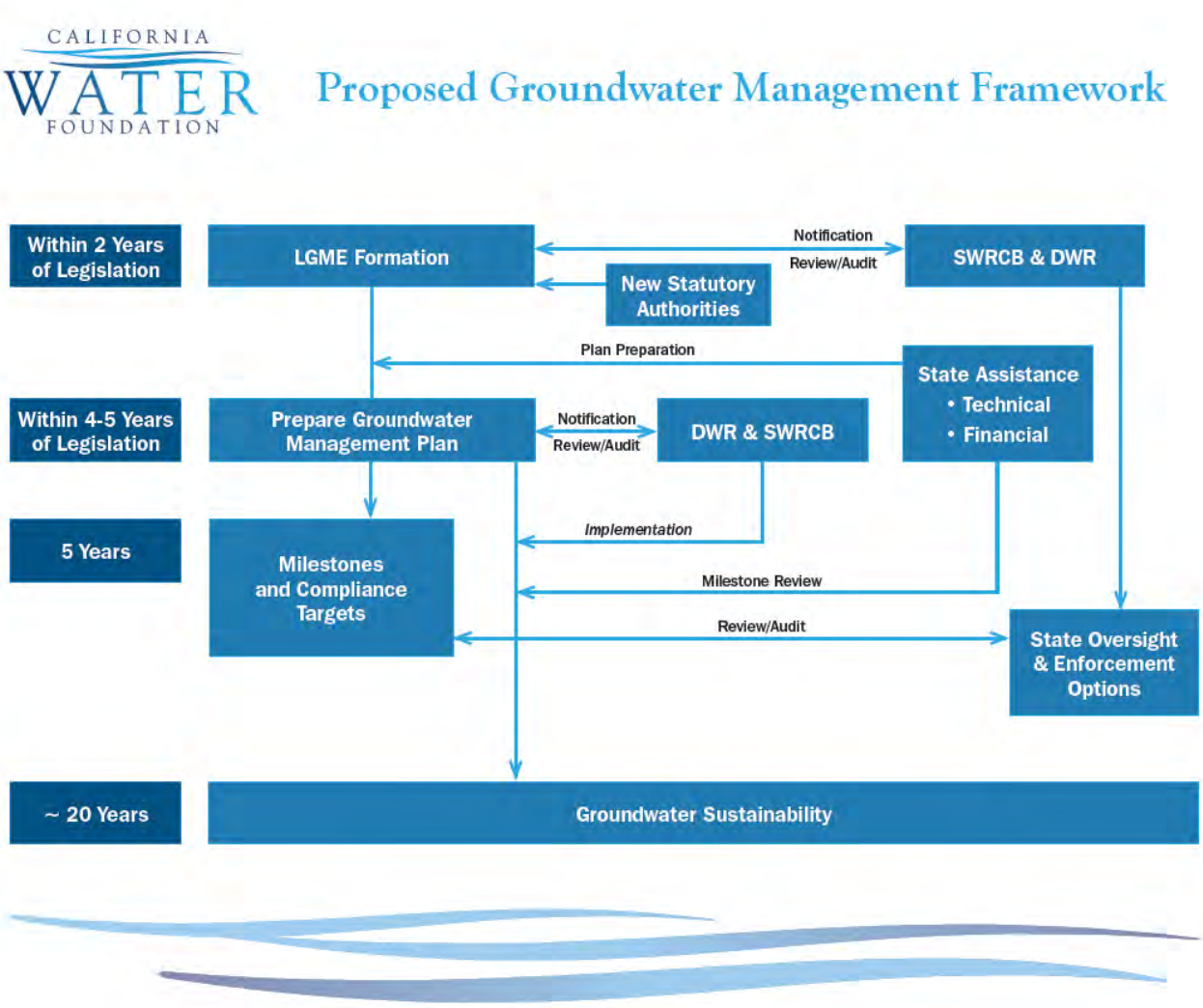
- A statewide water use surcharge has been under discussion for several years, and there were several recent legislative initiatives, but this appears unlikely to be useable. Surcharges are used at the local and regional levels.
- PPIC identifies a common fund regional model that returns tax revenues to regions that comply with criteria as one option in its March 2014 paper entitled "Paying for Water in California."
- State general obligation bonds have been an important source of funding for the past several decades.

Range of Stakeholder Views: CWF is aware of the following views regarding this Recommendation.

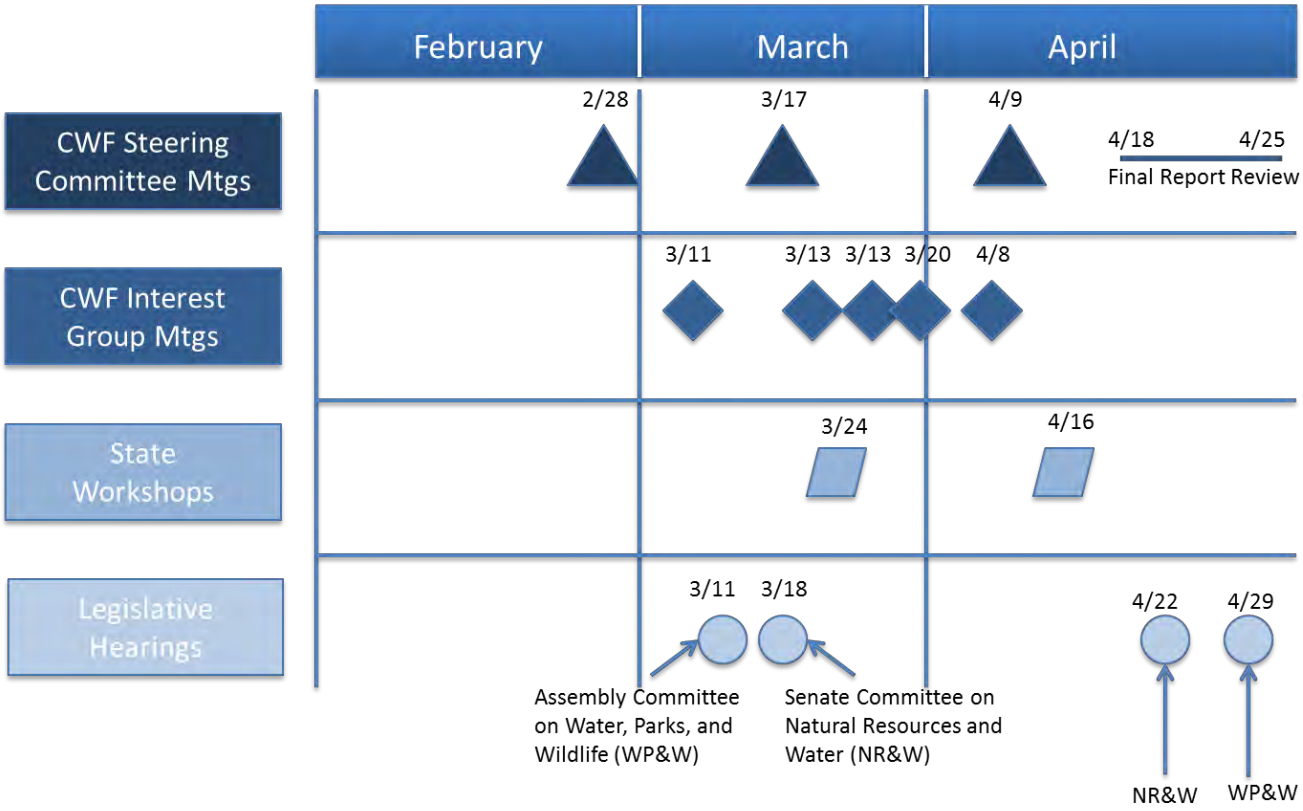
- There is broad opposition to the adoption of a statewide groundwater management program that imposes new costs, or unfunded mandates, at the local or regional level without a continuous, reliable source of funding.
- There is broad support for providing state funding for local and regional activities with minimal eligibility, application, and reporting requirements.
- Many stakeholders emphasized that funding cannot be allocated simply for GMP development but must be available for implementation.
- Stakeholders are uncertain about whether groundwater funding would be connected to current Integrated Regional Water Management, or if there should be dedicated groundwater funding.
- Most stakeholders support clear local fee authority, and there is modest support for surcharges on existing fees. Some stakeholders emphasized that fee authority should include criteria and limits, e.g., establishing initial fees, formulas for increases.
- Most stakeholders view certain provisions of Proposition 218 as a challenge to adopting local fees to support effective basin-wide management.
- Most stakeholders are aware of the shortcomings of AB 3030's fee replenishment authority approach based on actual experience since enactment of the statute in 1992.
- Some stakeholders expressed reservations about imposing local fees on groundwater pumpers specifically to address needs of disadvantaged communities, as opposed to addressing sustainable management goals. The specific purpose and justification for any such fees likely would receive considerable attention.
- Most stakeholders agree that if there is a water bond it should provide funding for the program described in this report.

Most stakeholders agree that if there is a water bond it should provide funding for the program described in this report

APPENDICES


CALIFORNIA
WATER
FOUNDATION
Proposed Groundwater Management Framework
Within 2 Years of Legislation
LGME Formation
Notification
Review/Audit
SWRCB & DWR
New Statutory Authorities
Plan Preparation
State Assistance
• Technical
• Financial
Within 4-5 Years of Legislation
Prepare Groundwater Management Plan
Notification
Review/Audit
DWR & SWRCB
5 Years
Implementation
Milestones and Compliance Targets
Milestone Review
Review/Audit
State Oversight & Enforcement Options
~ 20 Years
Groundwater Sustainability

Sustainable Groundwater Management Processes



Steering Committee List

Grant Davis and Marcus Trotta, Sonoma County Water Agency
Dan Dooley, University of California
Laurel Firestone, Community Water Center
Jim Fiedler, Santa Clara Valley Water District
Paul Gosselin, Butte County
Joe Grindstaff, Inland Empire Utilities Agency
Maurice Hall, The Nature Conservancy
Karen Keene, California State Association of Counties
Ken Manning, California Groundwater Coalition, San Gabriel Basin Water Quality Authority
David Orth, Kings River Conservation District
David Puglia, Western Growers Association
Randy Record, Eastern Municipal Water District
John Sweigard, Merced Irrigation District

California Water Foundation

Andrew Fahlund, California Water Foundation
Lester Snow, California Water Foundation
Kate Williams, California Water Foundation

Kearns & West Facilitation Team

Mike Harty, Kearns & West
Morgan Lommele, Kearns & West
Anna West, Kearns & West

CWF developed an online Information Bank available to the public to promote transparency and understanding about groundwater management. The initial set of resources is now available on our website www.californiawaterfoundation.org.

Resources

1. "State Water Boards Groundwater Workplan Website." *California Environmental Protection Agency, State Water Resources Control Board, Accessed on February 21, 2014. Added on February 24, 2014.*

- This website includes milestones and timeline, available documents, links to external reports with groundwater management recommendations, and staff contacts.

2. "California Water Action Plan." *State of California, January 2014. Added on February 24, 2014.*

- This Action Plan was developed by the California Natural Resources Agency, California Department of Food & Agriculture, and the California Environmental Protection Agency (CAL/EPA).

3. "Discussion Draft – Groundwater Workplan Concept Paper." *California State Water Resources Control Board, October 4, 2013. Added on February 24, 2014.*

- This discussion draft was developed by the California State Water Resources Control Board and published on October 4, 2013. The document was available for public comment until December 18, 2013. Comments received are available

4. "California Statewide Groundwater Elevation Monitoring Program – Groundwater Basin Prioritization Process." *California Department of Water Resources, December 2013. Added on February 24, 2014.*

- This brochure, maps, and white paper includes a draft statewide ranking of groundwater basin importance.

5. "Executive Summary: Sustainability From The Ground Up, Groundwater Management in California – A Framework." *Association of California Water Agencies, April 2011. Added on February 24, 2014.*

- This executive summary outlines the Association of California Water Agencies framework for groundwater management in California.

6. "Uncommon Innovation: Developments in Groundwater Management Planning in California." *Rebecca Nelson, Stanford University, Woods Institute for the Environment, March 2011. Added on February 24, 2014.*

- This report analyzes over 50 local groundwater management plans to find promising and innovative approaches to local groundwater management. The approaches are organized into four key themes: involving stakeholders, collecting good information, adopting a diverse "portfolio" of approaches to groundwater management, and taking steps to ensure that a plan can be implemented in practice.

7. "Under water: Monitoring and regulating groundwater in California." M. Rhead Enion, UCLA, School of Law, Pritzker Briefs, July 2011. Added on February 24, 2014.

- This paper describes the importance of groundwater to California and re-imagines groundwater management. It recommends a series of steps that California should undertake to achieve the goal of realigning the water rights system for groundwater.

8. "California's Groundwater: Bulletin 118 – Update 2003 Report." California Department of Water Resources, October 2013. Added on February 25, 2014.

- This California Department of Water Resources website includes the Bulletin 118 Update Report from 2003, including the complete report and downloads of individual report sections.

9. "The Delta Plan: Ensuring a Reliable Water Supply For California, a Healthy Delta Ecosystem, and a Place of Enduring Value." Delta Stewardship Council, 2013. Added on February 25, 2014.

- This plan was developed by the Delta Stewardship Council, which was established by the California legislature in 2009. The next edition of the Delta Plan is due in 2018 or sooner.

10. "Liquid Assets: Improving Management of the State's Groundwater Resources." California Legislative Analyst's Office, March 24, 2010. Added on February 25, 2014.

- This California Legislative Analyst's Office (LAO) report includes background, the state's approach to, current issues, and other states approaches to groundwater management. The report also presents the Legislature with a series of actions.

11. "Improving Management of the State's Groundwater Resources." California Legislative Analyst's Office, February 1, 2011. Added on February 25, 2014.

- This California Legislative Analyst's Office (LAO) report was presented to Assembly Water, Parks and Wildlife Committee, Hon. Jared Huffman, Chair.

12. "Managing California's Water: From Conflict to Reconciliation." Public Policy Institute of California, 2001. Added on February 25, 2014.

- This book includes three parts – Part 1 reviews past, present, and future conditions of water management in California; Part 2 focuses on major challenges and promising approaches for managing water in the future; Part 3 explores strategies for implementing policy reforms.

13. "Governor's Commission to Review California Water Rights Law." Governor's Commission, December 1978. Added on February 26, 2014.

- This commission report includes analysis and recommendations on certainty in water rights, improving efficiency in water use, protection of instream uses of water, and effective management of groundwater resources.

14. "Integrated Regional Management: Solving the Groundwater Challenge." ***Barton H. Thompson Jr. and Rebecca Nelson, Stanford University, Woods Institute for the Environment, October 2010. Added on February 26, 2014.***

- This Solution Brief proposes integrated regional management as a potential solution to groundwater management challenges.

15. "Report of the Conservation Commission of the State of California." ***Conservation Commission of the State of California to the Governor and Legislature of California 1912. Added on March 25, 2014.***

- This report was transmitted to the Governor and the Legislature on January 1, 1913.

16. "Irrigation of Twelve Million Acres in the Valley of California" ***Col. Robert Bradford Marshall, Distributed by the California State Irrigation Association, March 16, 1919. Added on March 25, 2014.***

- This report, California's Greatest Opportunity – Reclaiming An Empire—The Valley of California. Making Homes for 3,000,000 People. Increasing the Present Value More Than $6,000,000,000. By Col. R. B. Marshall was distributed by the California State Irrigation Association.

17. "The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention." *Michigan Law Review, Joseph L. Sax, January 1970. Added on March 25, 2014.*

- This article published in the Michigan Law Review discusses The Nature of the Public Trust Doctrine, The Contemporary Doctrine of the Public Trust: An Instrument for Democratization, and includes a Conclusion.

18. "Report of the State Water Commission of California." *California State Water Commission, January 1, 1917. Added on March 25, 2014.*

- This report of the State Water Commission of California was submitted to the Governor of the State of California on December 20, 1916 and published on January 1, 1917.

19."Legal Classification of Groundwater." *California State Water Resources Control Board, Hearings Program, Legal Classification of Groundwater. Added on March 25, 2014.*

- This webpage includes information that the State Water Resources Control Board gathered regarding the test for classifying subterranean streams flowing through known and definite channels.

20. "Land Subsidence from Groundwater Use in California" *Luhdorff & Scalmanini Consulting Engineers, Borchers & Carpenter, with support by California Water Foundation, April 2014, Added on April 21, 2014.*

- This report focuses on the escalating occurrence and severity of land subsidence due to groundwater pumping in California.

GLOSSARY

Adjudication. A case or proceeding to determine all the water rights in a stream system and/or groundwater basin. In the context of an adjudicated groundwater basin, landowners or other parties have turned to the courts to settle disputes over how much groundwater can be extracted by each party to the decision.

Aquifer. A saturated body of rock or sediment that is sufficiently porous and permeable to store, transmit, and yield significant or economic quantities of groundwater to wells and springs.

Bulletin 118. The Department of Water Resources originally published Bulletin 118 in 1975 to present the results of groundwater basin evaluations in California. The Bulletin 118 – Update 2003 identifies 515 groundwater basins and subbasins and includes information about the geology, groundwater quantity and quality, and current groundwater management practices in the basins.

Conjunctive Use. The coordinated and planned management of both surface water and groundwater resources in order to maximize the efficient use of the resource.

Groundwater Basin and Subbasin. An alluvial aquifer or a stacked series of alluvial aquifers with reasonably well-defined boundaries in a lateral direction and having a definable bottom. DWR defined and delineated groundwater basins and subbasins in Bulletin 118. Out of 431 delineated groundwater basins, 24 basins are subdivided into 108 subbasins. These 515 defined groundwater systems underlie about 40 percent of the surface area of the State.

Overdraft. The condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average. Because groundwater is extracted at a higher rate than it is replenished over this period of time, groundwater levels decline persistently under this condition.

Groundwater. Water that occurs beneath the land surface and fills the pore spaces of the alluvium, soil, or rock formation in which it is situated. It excludes soil moisture, which refers to water held by capillary action in the upper unsaturated zones of soil or rock.

Land Subsidence. The lowering of the natural land surface due to various processes, most notably groundwater extraction.

Recharge. Water added to an aquifer or the process of adding water to an aquifer. Groundwater recharge occurs either naturally as the net gain from precipitation, or artificially as the result of human influence.

Safe Yield. The maximum quantity of water that can be withdrawn annually from a groundwater basin without causing an undesirable result.

Sustainable Yield. The quantity of water that can be withdrawn from a sustainably managed groundwater basin. Sustainable yield differs from safe yield in that it accounts for impacts beyond lowering of groundwater levels. Determining sustainable yield involves developing a water balance for the basin, which includes the total water entering and leaving the basin, changes in the amount of water stored in the subbasin, and connections to surface waters. In addition to avoiding declining

groundwater levels sustainable yield of the basin avoids adverse impacts to instream beneficial uses and groundwater quality.

Surface Water. Water found in ponds, lakes, streams, rivers, reservoirs, and inland seas.

Watershed. A watershed is an area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel.

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Recommendations for Achieving Groundwater Sustainability

Prepared by the Association of California Water Agencies

Recommendations for Achieving Groundwater Sustainability

I. Introduction and Background

The Association of California Water Agencies (ACWA) has prepared these recommendations in response to growing concern about potentially unsustainable groundwater level declines, local subsidence and degraded groundwater quality in some subbasins and widespread recognition that further action is required to promote and achieve groundwater sustainability throughout California.

Most groundwater basins in the state are under sound local and regional management; some, however, are not. Local control of groundwater continues to be the most effective form of management, even in areas where sustainability concerns have emerged and must be addressed. Existing authorities and requirements for managing groundwater basins provide a strong foundation, but achieving more sustainable management requires additional tools to augment that foundation. The Brown Administration also has recognized the need for additional tools, noting in its California Water Action Plan (January 2014) that sustainable groundwater management can be improved by ensuring "that local and regional agencies have the incentives, tools, authority and guidance to develop and enforce local and regional management plans that protect groundwater elevations, quality and surface water-groundwater interactions."

In many areas, including parts of the San Joaquin Valley, overdraft has been and continues to be exacerbated by a significant reduction in available surface water supplies over the past two decades. The inability of the State Water Project and the federal Central Valley Project to reliably deliver contracted water supplies has eliminated a substantial amount of surface water that once played a key role in recharging groundwater basins. In many cases, demand for groundwater is directly related to the reliability and availability of surface water supplies. The loss of reliable surface water supplies means that past investments in local and regional water systems – and the agricultural, urban and environmental water uses long supported by conjunctive management of surface water and groundwater resources – are now at risk.

To be sure, there are instances where unchecked new groundwater demands in unmanaged areas are putting new stresses on groundwater resources, sometimes with devastating effects on other users within the same basin or even in a neighboring basin that is being well managed. Like the loss of surface water supplies, this presents an untenable situation that simply must not go unaddressed.

This document outlines ACWA's suggested approach for achieving groundwater sustainability and identifies incentives, tools and authorities required to implement that approach. The recommendations provided here are focused primarily on basins and subbasins defined by the Department of Water Resources' California Groundwater Bulletin 118.

Fractured bedrock and other settings that fall outside of basins and subbasins defined by Bulletin 118 are not the focus of these recommendations. Groundwater extractions in these settings typically are site-specific or condition-specific and lack connection to areas covered by a local or regional groundwater management plan. As such, they present unique issues and warrant special consideration outside the scope of this document.

ACWA's recommendations build on the Association's Board-adopted Groundwater Management Policy Principles (March 2009) and ACWA's landmark document, "Sustainability from the Ground Up: A Framework for Groundwater Management in California" (April 2011), which provided an in-depth look at groundwater management in California and recommended proactive steps to advance groundwater sustainability.

ACWA recognizes that various legislative changes are needed to provide the authorities necessary to implement many of these recommendations. Given the importance and complexity of state policy in this area, any necessary changes should be proposed and considered through the normal legislative process for policy bills, as opposed to through the budget trailer bill process. The policy bill process will provide more time for thoughtful deliberation on the legislation and will allow for increased transparency and stakeholder input.

Implementing the following recommendations will significantly improve groundwater management capabilities where they are deficient, accelerate the achievement of sustainability by local and regional entities, and guide enhanced state support where needed.

II. Policy Objectives for Achieving Groundwater Sustainability

The following policy objectives must be advanced simultaneously to ensure groundwater sustainability in California.

1) **Enhance Local Management.** Groundwater basins should continue to be managed by local and regional agencies with input from local stakeholders through a local or regionally-developed and administered Groundwater Management Plan (GMP).

2) **Establish Mandatory Minimum Groundwater Management Plan Requirements and Increased Authorities.** Local groundwater management planning must become uniformly consistent with or functionally equivalent to requirements laid out in SB 1938 (Machado, 2002) (Water Code Section 10753 et seq.). Additionally, Section III below identifies sustainability timeframes (Recommendation 1) and additional tools and authorities (Recommendation 5) needed to advance sustainable management.

3) **Avoid or Minimize Subsidence.** In areas where groundwater pumping is resulting in subsidence at levels causing damage or risk of damage to overlying infrastructure that affects parties outside of an existing management area, additional land use planning, engineering, capital improvement and monitoring and reporting requirements -- including possible pumping restrictions in the impacted area -- should be implemented by the local or regional groundwater management agency.

4) **Assess Groundwater Connection to Surface Waters.** GMPs should include an evaluation of the relationship the surface water source has to groundwater levels and quality in the subbasin or basin and identify the impacts, if any, on the surface water source and its related public benefits.

5) **Improve Data Availability.** Many groundwater management agencies currently monitor and collect groundwater data to implement successful groundwater management strategies to address overdraft conditions or concerns. Consistent with their GMPs, groundwater management agencies should collect appropriate management data and make it publicly available both locally and to the state through the Department of Water Resources' (DWR) California Statewide Groundwater Elevation Monitoring (CASGEM) program.

6) **Increase Groundwater Storage.** Storing surface water in underground storage basins is necessary to optimize use of the state's limited and highly variable water supplies. This need will only increase with climate change. California must take aggressive steps to develop significant new groundwater storage and conjunctive use projects, including potential state funding for local project capital costs.

7) **Remove Impediments to Recharge.** Coordinated and planned use of surface water, recycled water, stormwater and groundwater resources to maximize the availability and reliability of water supplies is an essential management method. Policies that are impediments to groundwater recharge should be evaluated and revised as necessary.

8) **Do No Harm.** In many areas of the state, sustainable local and regional groundwater management is being accomplished successfully. Contemplated changes to groundwater management statutes and other potential requirements should not impose additional undue burdens or mandates in these areas.

9) **Reassess Surface Water Reallocations.** Actions by the State Water Resources Control Board (SWRCB) to reallocate surface water supplies to dedicated instream uses and water quality certification requirements have affected and will continue to affect to a significant degree the management and sustainability of groundwater basins in areas that previously relied on that surface water. Consequently, implications for groundwater management should be considered explicitly when the SWRCB undertakes its balancing of beneficial uses of water in the broad public interest.

10) **Provide State Financial and Technical Assistance.** The state, through DWR, should provide significant new financial assistance and technical support to local and regional agencies for improving or developing GMPs. Developing management capacity in currently unmanaged areas should be the first priority.

11) **Provide a "Backstop."** SWRCB authority should be applied only where local agencies are unwilling or unable to sustainably manage the groundwater resource despite having the tools and authorities to do so and when an appropriate period of time has passed (considering the unique management issues and geology/hydrology of the subbasin or basin) without demonstrated progress toward sustainability. The SWRCB should intervene as a last resort, in carefully prescribed circumstances and for limited duration, and should restore local control at the earliest opportunity.

III. Recommended Administrative and State Legislative Actions

ACWA recommends the following administrative and state legislative actions to help achieve the above policy objectives. Actions should be prioritized to address critical, rapidly deteriorating basins or subbasins through a combination of capacity building, technical assistance and financial support. New requirements and new local and regional authorities should be established where needed to initiate and implement effective GMPs.

1. Adopt State Definition of "Sustainable Groundwater Management"

The state should adopt a definition of "sustainable groundwater management" in statute. ACWA recognizes this is a complex issue that must take into account spatial and time scale considerations, multiple resource management objectives and stakeholder perspectives.

In its 2011 Groundwater Framework, ACWA developed the following definition of sustainability in the context of groundwater:

<u>ACWA 2011 Definition of "Sustainability"</u>

> *Actively managing the resource at the local level in a way that satisfies the needs of both the environment and the economy while ensuring the continued health of the basin.* [1]

ACWA also agrees with and has cited the following definition developed by the United States Geological Survey (USGS):

<u>United States Geological Survey: "Sustainability of Groundwater Resources"</u>

> *Development and use of groundwater in a manner that can be maintained for an indefinite time without causing unacceptable environmental, economic, or social consequences.* [2]

Sustainability by nature implies a perpetual timeframe. In this context, ACWA recommends the following updated definition to underscore that sustainable groundwater management requires a long-term and continuous investment in effective planning and implementation.

<u>Proposed State Definition of "Sustainable Groundwater Management"</u>

> *"Sustainable groundwater management" is the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing unacceptable related environmental, economic or social consequences through the development, implementation and updating of plans and programs based on the best available science, monitoring, forecasting and use of technological resources.*

Local or regional GMPs should be required to develop subbasin or basin-relevant indicators and performance metrics that could be used by DWR and the SWRCB to evaluate objectively the plans' ability to achieve progress toward "sustainable groundwater management."

2. Prioritize Unmanaged Basins or Subbasins

The state must identify and prioritize action based on the severity of groundwater threats in basins and subbasins that are not currently being managed by local or regional agencies. DWR should be directed to identify those basins or subbasins that are designated as "medium" or "high" priority based on the CASGEM basin prioritization study (2013) and that are not currently being managed by a local or regional groundwater management agency or that are not currently covered by a comprehensive (meaning complete coverage of the basin or subbasin) local or regional GMP (or functional equivalent). DWR also should identify other specific areas where groundwater use is creating damage or significant risk of damage to overlying infrastructure (conveyance, transportation, flood channels, distribution systems, etc.) external to that of the management agency that is not being addressed currently and where groundwater management assistance may be warranted.

3. Adopt Uniform Minimum Requirements for Groundwater Management Plans and Implementation

The state should adopt uniform minimum requirements for GMPs for all basins or subbasins (with the exception of adjudicated basins or subbasins). Existing local and regional GMPs in basins or subbasins statewide should be reviewed and updated by the local or regional groundwater management agency to meet the following requirements:

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[1] ACWA (2011). *Sustainability From the Ground Up: Groundwater Management in California – A Framework* p.7

[2] Alley, W.M., Reilly, T.E., and Franke, O.L. (1999). *Sustainability of Ground-Water Resources: U.S. Geological Survey Circular* 1186.

a) **Planning Boundary.** The optimum unit for groundwater management should be a subbasin as defined by DWR Bulletin 118. Preferably, each subbasin should be covered by only one GMP. Where multiple existing plans cover different portions of a subbasin or basin, they should demonstrate coordination such that the goals and basin management objectives of respective GMPs are complementary in their contribution to basin sustainability and do not conflict or impede management activities of neighboring groundwater management agencies. All lands overlying the subbasin should be subject to the provisions of the locally-adopted GMPs. A groundwater management planning agency should be authorized to incorporate into its existing GMP neighboring areas overlying its subbasin not already covered by another GMP. A subbasin boundary may be adjusted to address hydrologic conditions and other features of the subbasin, based on a technical analysis supporting the boundary adjustment and in consultation with adjacent subbasin groundwater management agencies and DWR. If groundwater users in a portion of a subbasin outside of the jurisdictional boundary of a groundwater management agency choose not to participate in a GMP, they should be required to prepare an individual GMP and be subject to SWRCB intervention as described in Recommendation 7 in this section.

b) **Plan Standards.** GMPs should satisfy SB 1938 (Water Code Section 10753 et seq.) standards or their functional equivalent, including basin management objectives associated with groundwater quantity and quality, as well as subsidence and monitoring programs that meet the sustainability objective discussed above. Existing GMPs that do not meet SB 1938 standards should be required to be updated to satisfy them.

c) **Compliance Requirements.** GMPs in basins or subbasins designated by DWR as “medium” or “high” priority based on the CASGEM basin prioritization study should be updated and adopted by local and regional agencies within five years of establishment of the mandatory minimum standards. GMPs should not be required in “low” priority basins or subbasins but should be encouraged and supported. GMPs should be required if a “low” priority basin or subbasin is subsequently reclassified as “medium” or “high.” GMPs should include an implementation schedule and best management practices and tools to ensure local and regional agencies can verify progress toward achievement of quantifiable basin management objectives, resulting in sustainable groundwater management.

d) **Sustainability Timeframe.** GMPs should be developed to ensure that sustainable groundwater management (defined above) will be achieved over a specific timeframe, which must be long enough to be feasible and provide for implementation success (groundwater moves extremely slowly), yet short enough to spur committed action. GMPs should include an analysis demonstrating that implementation of the basin management objectives should achieve sustainable groundwater management in the basin or subbasin within 20 years. GMPs should include a planning and implementation horizon of at least 50 years. Extensions beyond the 20-year sustainability timeframe may be necessary in some instances based on particular circumstances; but in no case should an extension exceed 10 years (30 years total).

e) **Groundwater Extraction Prohibition.** Extraction of groundwater for newly developed lands (including agricultural plantings) outside of groundwater management areas is a significant issue. Unless covered by a GMP, groundwater extractions for new development (commercial, multi-family residential or industrial) or new plantings of permanent crops should be prohibited in “medium” and “high” priority groundwater subbasins. (This provision should not apply to single-family domestic wells.) As discussed below, this requirement should be administered through a locally-administered well permitting process.

f) **Technical Review and Approval.** GMPs should be subject to technical review for adequacy by DWR and should be approved, conditionally approved or determined to be inadequate and returned for revision within six months. GMPs that are determined to be inadequate should be revised and resubmitted to DWR within six months. For GMPs that continue to be determined to be inadequate, the SWRCB should intervene

and impose an adequate GMP (after a public hearing) as necessary to ensure progress toward sustainability of the subbasin or basin. (See Recommendation 7 below.)

g) **Performance Reporting.** Performance reports for all GMPs comparing current status to basin management objectives should be submitted to DWR annually. Summaries of monitoring data should be made available regularly to DWR's CASGEM program and locally to basin or subbasin stakeholders through web-based applications or similar methods.

h) **Performance Review.** GMPs and performance reports for subbasins identified through CASGEM as "medium" and "high" priority areas should be subject to review by the SWRCB on a periodic basis (every five years) to ensure that they are meeting performance metrics and are progressing toward or have achieved sustainable groundwater management.

4. Develop Best Management Practices

DWR should be directed to develop a best management practices (BMPs) guidebook that would provide a "toolbox" for local and regional groundwater management agencies to facilitate completion of effective GMPs and provide a template for evaluation of their adequacy. This BMPs guidebook should be developed using a robust and inclusive stakeholder process (similar to the process already in place to develop guidance for preparation of Urban Water Management Plans or Agricultural Water Management Plans). Example BMPs from existing successful GMPs should be considered, along with best practices proposed by groundwater management professionals, associations, academia and other sources.

GMPs would not be required to incorporate all of the identified BMPs. The local or regional groundwater management agency would select BMPs for inclusion in the GMP that would result in a sustainably-managed subbasin or basin. Additionally, the local or regional agency could develop or adopt alternative practices that would result in a sustainably-managed basin or subbasin.

The BMPs guidebook should include, but not be limited to, the following elements:

a. **Illustrative Quantifiable Basin Management Objectives.** Methods for developing quantifiable basin management objectives relevant to the conditions of a particular subbasin, which could include but not be limited to: groundwater quantity assessment and monitoring, annual operational parameters for exercising the subbasin, drought management, aquifer recharge (both direct and indirect) and storage, groundwater quality, percolation capability or injection levels, land subsidence and characterization of surface water-groundwater relationships based on subbasin-specific hydrological analysis.

b. **Subbasin Boundary Adjustment.** Methods for conducting subbasin interconnectivity analysis and adjusting subbasin boundaries. This could be similar to the Integrated Regional Water Management (IRWM) boundary determination and acceptance process administered by DWR.

c. **Groundwater Monitoring.** Methods for implementing groundwater monitoring programs for groundwater elevation, extraction, aquifer recharge, change in storage and water quality.

d. **Well Permitting.** Administrative methods for well permitting, well construction and well abandonment.

e. **Groundwater Recharge.** Protocols for evaluating and implementing spreading basin and storage projects, for example: stormwater capture and related potential treatment and recharge projects, on-farm return systems, multi-objective flood control and habitat restoration projects and other methods to increase groundwater supplies.

f. **Sustainability Indicators.** Methods to develop and apply locally relevant sustainability indicators that can be used to demonstrate sustainable groundwater management (as defined above).

g. **Overdraft Measures.** Taking into account that some groundwater management agencies "exercise" their basins and utilize regular groundwater withdrawals and drawdown ("managed overdraft") as tools within a comprehensive multi-source, multi-year planning horizon, methods should be identified to develop locally relevant measures of "overdraft" and "critical condition of overdraft." DWR Bulletin 118 definitions provide reasonable guideposts for consideration. The definition of "overdraft" in Bulletin 118 is "the condition of a ground water basin where the amount of water extracted exceeds the amount of ground water recharging the basin over a period of time," and "critical condition of overdraft" is defined as water management practices that "would probably result in significant adverse overdraft-related environmental, social, or economic effects."

h. **Public Review Process.** Protocols for conducting open, inclusive and transparent stakeholder and public review processes in the development, implementation and administration of a GMP.

i. **Governance Structures.** Examples of governance structure options that could be used to prepare and manage GMPs based on the specific conditions and needs of the basin or subbasin, or where joint governance or coordination of multiple GMPs is necessary or preferable. In the latter instance, governance options may include, but are not limited to, a Joint Powers Authority (JPA), a Memorandum of Understanding (MOU) among existing agencies, an IRWM planning group, a newly created special district, any of which may include a locally-authorized Watermaster, or some other appropriate local or regional governance entity.

j. **Data Collection and Reporting.** Protocols and standards for conducting adequate data collection and reporting of groundwater elevations, water quality, subsidence levels and surface water-groundwater relationships to verify progress toward basin management objectives. The BMPs should include recommended quality control and quality assurance protocols.

k. **Demand Management.** Examples of potentially applicable demand management programs including, but not limited to, use of irrigation and water use efficiency technology, land retirement programs, conservation easements and related incentives, pumping restrictions, tiered allocation of usable groundwater and closer integration with demand management programs contained in Urban Water Management Plans or Agricultural Water Management Plans of agencies within GMP areas.

5. Enhance Local and Regional Agency Authority

Local and regional groundwater management agencies need enhanced authority to successfully implement their GMP basin management objectives to achieve sustainable groundwater management. Although some types of local or regional groundwater agencies or forms of governance are currently authorized and already may be using some of the following authorities, this is generally the exception rather than the rule. Local and regional groundwater management agencies statewide should be granted all of the following authorities and be empowered to select the ones they determine to be necessary and most effective to implement their GMPs.

a) **Groundwater Management Fees.** Groundwater management agencies need to fund required planning and administrative activities, data collection and reporting, acquisition of supplemental water for replenishment, acquisition of lands or easements to reduce demand, and implementation of BMPs. Local or regional agencies should be granted authority to impose fees or assessments based on estimates or reports

of groundwater use or other means in compliance with existing state law. Legislation may be needed to address current barriers to imposing local groundwater-related fees. (See Recommendation 6.)

b) **Groundwater Allocation and Extraction Limits.** The rights of individuals to pump groundwater should be subject to responsible management regulations by groundwater management agencies in much the same way that the use of property is subject to land use regulations by cities and counties. Groundwater management agencies should be authorized to monitor or estimate groundwater use within a basin or subbasin and impose allocation programs or pumping restrictions in time or amount, create exemptions for small or disadvantaged users, or to develop tiered pricing or other market-based means to implement basin management objectives and ensure sustainable groundwater management. Allocation and extraction limits may raise a significant issue with respect to groundwater rights and legal priorities among groundwater users. Further legal analysis and discussion of such issues is necessary to ensure these tools and authorities can be implemented in a legally defensible manner.

c) **Well Permitting.** Some local or regional groundwater management agencies manage well permitting programs. In other cases counties manage well permitting programs that may or may not be implemented cooperatively with groundwater managers. Where well permitting programs are lacking or need significant improvement to provide essential management information to implement GMPs and basin management objectives, local or regional groundwater management agencies should be authorized to assume or cooperatively manage well permitting responsibilities. Existing well permitting programs may need to be expanded and adequately funded to ensure that location, well depth, water quality and production information is collected and well construction specifications and well abandonment standards are enforced. New well permits should be conditioned upon receiving a water availability determination and "will serve" letter (see "e" below).

d) **New "Summary Proceeding" Enforcement Capability.** Along with new responsibilities and authorities to manage groundwater, local or regional groundwater management agencies should be granted new enforcement authority. Enforcement should be focused and limited to those instances where landowners or other groundwater users are in violation of groundwater management requirements, have been issued time-limited corrective notices and have been given a reasonable period to comply. In these cases, the landowner should be subject to a "summary proceeding" such as authorized by California Code of Civil Procedure, Part 3, Title 3 to enforce property-related violations. This provision could be amended to add a new chapter, "Summary Proceedings Associated with Violation of Basin or Subbasin Groundwater Regulation," which would be instituted to obtain appropriate judicial review, judgment and writ of execution (with service and return by appropriate sworn law enforcement personnel in cooperation with the groundwater management agency) resulting in cessation of the groundwater extraction and use pending the completion of required corrective measures and payment of monetary damages, attorney fees and costs of the proceeding.

e) **Water Availability Determinations.** Currently, new development projects are required to secure "will serve" letters from local water agencies, and larger projects are subject to Water Availability Determinations to show that sufficient water is available as part of the land use approval process. This requirement should be expanded. Land use agencies should be required to consider protection of prime groundwater recharge areas and consult groundwater management agencies regarding any significant groundwater-dependent development, including new permanent crop plantings, in order to obtain "will serve" letters and Water Availability Determinations.

f) **GMP Consistency Determinations.** County and city general plans are currently required to consider the Urban Water Management Plans of water agencies within their jurisdictions. This requirement should be extended to GMPs for the basins or subbasins within their jurisdictions. In addition, groundwater management agencies should be authorized to issue "GMP Consistency Determinations" for all new proposed industrial, residential or agricultural development (including introduction of permanent crops) that may have a significant effect on groundwater resources. "GMP Consistency Determinations" should be used by the lead agency to inform project environmental impact assessments and discretionary land use approvals. Where new proposed groundwater use is determined to be inconsistent with the GMP and to impede attainment of sustainable groundwater management, it should be presumed to have a "significant adverse impact on the environment" under CEQA and either be mitigated or be subject to a Statement of Overriding Consideration by the lead agency.

g) **Expedited LAFCO Formation Assistance.** In basins or subbasins in which there is no existing local and regional groundwater management agency, the applicable Local Area Formation Commission should be authorized to provide special technical assistance and an expedited timeline to facilitate the formation of such an agency. This process also should apply to existing groundwater management agencies that are required or seek to annex into their jurisdictions unmanaged lands overlying the subbasin or basin managed pursuant to their GMPs. The cost to provide this expedited agency formation assistance should be included in the new agency's administrative budget and assessment fees and reimbursed to the LAFCO within one year of the creation of the new agency.

6. Ensure Adequate Funding

The SWRCB and DWR should coordinate available funding and resources from the Governor's proposed budget to identify basins or subbasins lacking coverage by an existing comprehensive GMP (see Recommendation 2, above).

For basins or subbasins in which there are existing local or regional groundwater management agencies to prepare or revise and implement GMPs, required funding should be predominantly based on local or regional fees or assessments, assuming successful implementation of Recommendation 5a., regarding funding. Local or regional groundwater management agencies also should continue to supplement their funding through grants or loans from existing state and federal funding programs (especially if the basin or subbasin includes disadvantaged communities that are dependent upon groundwater that fails to meet public health standards).

ACWA opposes the imposition of a statewide water user fee or "public goods charge" but stands ready to work with the Administration to identify alternative ways to help ensure adequate funding for local and regional groundwater management agencies to implement their GMPs. ACWA acknowledges the constraints local agencies face in raising fees for needed groundwater management investments (e.g. Proposition 218) and is committed to a dialog about sustainable and integrated financing.

Finally, an additional funding source may be created during development of a new proposed state water bond, if approved by California voters. Significant bond funding could be targeted to create an incentive for development of new groundwater storage projects in basins or subbasins that have adopted GMPs and sustainability indicators that demonstrate sustainable groundwater management.

7. Provide for State Backstop Authority When Local Action Has Not Occurred or Has Been Insufficient

In those instances where there is no groundwater management agency in a basin or subbasin and where the local or regional entity does not develop or implement a compliant GMP within defined timelines, or where the local or regional entity fails to meet performance objectives set forth in an approved GMP, the SWRCB should hold a hearing for each basin or subbasin and invite affected local, regional and other stakeholders to present information

to inform SWRCB decision-making regarding whether corrective action is necessary and likely to be most effective under the specific circumstances.

Based on the results of the hearing, the SWRCB should either 1) issue an order to a qualified local or regional agency that includes a compliance schedule for completion and implementation of a GMP that will result in progress toward sustainability; or 2) assign to a qualified third party the responsibility to develop and implement a compliant GMP under contract to the SWRCB and subject to final approval by the SWRCB. In either case, the SWRCB should be given authority to assess a fee sufficient to cover the cost of SWRCB administration, and any work by a third-party contractor. The fee should be collected by the local agency, and it should be clear that the fee is a "property-related fee."

During this period of plan development, the SWRCB should order that groundwater extraction be reduced throughout the subbasin as necessary to preserve the potential for achieving sustainable groundwater management within a 30-year timeframe. The SWRCB should be required to hold a hearing to develop a protocol or allow for alternatives to achieve the same reduction in demand to facilitate recovery of the basin.

SWRCB should return management to a new or existing qualified local or regional agency as soon as practicable after a reasonable demonstration of willingness, organization and financial capacity has been made.

8. Remove Impediments to Water Supply Reliability

Sustainable groundwater management in California depends on creating more opportunities for robust conjunctive management of surface water resources. Many groundwater basins facing unsustainable overdraft conditions have depended on previously reliable surface water supplies that are no longer available. A significant number of these areas have lost surface supplies that were once conjunctively managed but have now been reallocated to serve instream or other regulatory requirements in response to various judicial, state and federal mandates. Climate change will only intensify the need to recalibrate and reconcile surface and groundwater management strategies.

As an illustration, water conveyed through the Delta for delivery to areas on the west side of the San Joaquin Valley and the Tulare Basin has been greatly reduced over the past 20 years due to a variety of regulatory actions. Those deliveries – and deliveries to Southern California and parts of the Bay Area, as well -- were designed in part to remedy overdraft conditions recognized many years ago. Both the state and federal governments, as operators of the State Water Project and the federal Central Valley Project, respectively, have reduced the reliability and average amount of deliveries and thus have severely diminished the supplemental supplies historically available and incorporated into plans for conjunctive use in these areas. Similar changes and resulting ramifications have occurred in some portions of the east side of the San Joaquin Valley as well. The SWRCB and the Administration cannot divorce groundwater conditions and management from overall state water policy. Any public trust balancing by the SWRCB must weigh the value of surface water for groundwater replenishment and recharge to promote the state's interest in groundwater sustainability.

The SWRCB and DWR should identify ways to reduce impediments and regulatory barriers to facilitate more water transfers, increase stormwater and recycled water recharge, and provide significant funding and technical assistance to develop projects that restore conjunctive balance by facilitating new surface and groundwater storage and conveyance projects statewide.

IV. Statement of Commitment

ACWA and its member agencies have demonstrated a history of strong leadership in confronting and embracing needed changes to manage our groundwater resources in California. ACWA is committed to working with the state and with urban and agricultural water users, growers and landowners, environmental and disadvantaged community interests, and other stakeholders on an effective approach to promote and achieve sustainable groundwater management throughout California.

Association of California Water Agencies
Leadership • Advocacy
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